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SAE: Society of Automotive Engineers, Dept. HSL, 400 Commonwealth Drive, Warrendale, Pa. 15096. Order by title and SAE report number.

TRB: Transportation Research Board, National Academy of Sciences, 2101 Constitution Ave., N.W., Washington, D.C. 20418.

ERRATUM

In Highway Safety Literature No. 77-11, dated November 30, 1977, errors appeared in entry no. HS-020 997 on page 7. The corporate author was given as located in Victoria, Canada, and should have been shown in the State of Victoria, Australia. This item is available from:

Monash Univ., Dept. of Social and Preventive Medicine,
Prahran, Vic., 3181, Australia

Also, in line two of the abstract, "a Canadian hospital" should read "the Alfred Hospital, Melbourne,".

ABSTRACT CITATIONS

NHTSA accession number ---------- HS-013 124

Title of document ---------- **MAXIMUM BRAKE PEDAL FORCES PRODUCED BY MALE AND FEMALE DRIVERS**

Abstract ---------- The object of this research was to obtain data concerning the maximum amount of brake pedal force that automobile drivers were able to sustain over a period of ten seconds. Subjects were told to apply the brakes in the test car as they would in a panic stop, and to exert as much force as possible on the pedal over the entire ten second test period. A total of 84 subjects were tested, including 42 males and 42 females. The results indicated that there is a wide distribution of values which characterizes the pedal force that the subjects were able to generate. Male subjects produced generally higher forces than did females. Over half the women tested were unable to exert more than 150 lbs. of force with either foot alone, but when both feet were applied to the pedal, force levels rose significantly.

Personal author(s) ---------- by C. R. VonBuseck
Corporate author (or author's affiliation) ---------- General Motors Corp.
Publication date; pagination ---------- 1973? ; 18p
Supplementary note ---------- Excerpts from Maximum Parking Brake Forces Applied by Male and Female Drivers (EM-23) BY R. L. Bierley, 1965, are included.
Availability ---------- Availability: Corporate author

NHTSA accession number ---------- HS-018 924

Title of document ---------- **NATURAL FREQUENCIES OF THE BIAS TIRE**

Abstract ---------- The lowest natural frequencies of a bias tire under inflation pressure are deduced by assuming the bias tire as a composite structure of a bias-laminated, toroidal membrane shell and rigorously taking three displacement components into consideration. The point collocation method is used to solve a derived system of differential equations with variable coefficients. It is found that the lowest natural frequencies calculated for two kinds of bias tire agree well with the corresponding experimental results in a wide range of inflation pressures. Results of the approximate analysis show that the influences of the in-plane inertia forces on natural frequency may be considered small, but the influences of in-plane displacements are large, particularly on the natural frequency of the tire under low inflation pressure.

Personal author(s) ---------- by Masami Hirano; Takashi Akasaka
Journal citation ---------- Publ: Tire Science and Technology v4 n2 p86-114 (May 1976)
Publication date ---------- 1976; 6refs
Availability ---------- Availability: See publication

HS-021 571

TOWARD REPRESENTATIVE MOTORCYCLE STATISTICS: A PRELIMINARY REPORT

Motorcycle statistics, used to evaluate legislative reforms, are based on data that are largely nonuniform, incomplete, and inconsistent from state to state. Studies and evaluation of social reforms regarding motorcycles are seriously deficient if they employ data at face value. When 'clean' statistics can be combed from the masses of data, results may contradict those of statistics based on inconsistent data. Classical experimental designs are difficult in the motorcycle field due to seasonal variations in data recording and lack of control groups. Quasi-experimental designs should be undertaken with care in order to prevent rival hypotheses from emerging as plausible alternatives to the same data. Factors to be considered in such designs include special events, inherent stability of data, and the degree of advocacy of the specific reform being considerd. The statistical recording method used by each state is tabulated along with types of registration, accidents, and fatality statistics. Average fatality/100 accident ratios are tabulated for 18 states before and after helmet usage laws; statistics indicate that the helmet laws did not reduce the number of fatalities to motorcyclists that occur in a given number of accidents.

by Gary L. Winn
American Motorcyclist Assoc., Westerville, Ohio 43081
Publ: HS-021 568, "American Association for Automotive Medicine. Proceedings of the 21st Conference," Morton Grove, Ill., 1977 p26-39
1977; 8refs
Presented at the Conference held in Vancouver, B.C., Canada, 15-17 Sep 1977.
Availability: In HS-021 568

HS-021 611

AXLE LUBRICANT CAN AFFECT FUEL ECONOMY

Via computer simulation, Ford engineers estimated the magnitude of fuel savings obtainable by modifying lubricant viscosity-temperature behavior and frictional properties. The program was divided into the following phases: laboratory screening of commercial lubricants to evaluate viscosity, frictional, and extreme pressure properties; dynamometer testing of selected lubricants in a production-design axle to evaluate the effects on parasitic losses; and estimation of fuel economy savings by applying axle dynamometer data to a vehicle simulation computer program. Three fully formulated lubricants were chosen to examine the effect of viscosity-temperature behavior on power losses. Lubricant A had outstanding low temperature viscosity; lubricant B had a 100° C viscosity equivalent to SAE 90, but much lower viscosity at low temperatures, outstanding extreme pressure properties as judged by the high speed Timken test and good frictional properties judged by the LFW friction test; lubricant C is an SAE 90 gear lubricant used to obtain baseline data. Lubricants D and E, containing 3% molybdenum disulfide and 3% graphite respectively, were formulated by adding the solids to C, and were included to evaluate the effect of dispersed solid lubricants. Available information indicates that substantial fuel savings are obtainable from improved axle lubricants during short-trip winter driving. Lubricants similar to A and C gave a 4.5% fuel economy difference in some of Ford's unpublished research with a 3652 lb car driven 10 miles at -7° C ambient. An initial difference of 3.6% is projected for A and C for the CVS cold start cycle during warm up; this difference decreases substantially, becoming nil at the end of the CVS cycle (65° C). A difference on the order of 1% would be anticipated over the entire cycle. Lubricant A, though it shows greater fuel economy benefits at low temperatures, gives poorer results at 93° C and is expected to have an adverse effect on axle durability. For the CVS cold cycle, B and C are projected to show an initial difference of 2.3% and a difference of less than 1% over the entire cycle. Some synthetic lubricants provide high temperature viscosity equivalent to conventional SAE 90 lubricants along with reduced lower temperature viscosity, resulting in improved performance over the entire driving range. The improvement in fuel economy projected for the best all-temperature candidate synthetic is on the order of 5% for short-trip winter driving, but less than 1% for the CVS and highway driving cycles run at 21° C ambient temperature. Future work should include evaluation of low viscosity conventional gear lubricants fortified with dispersed solid lubricants, since such additives can reduce power losses during mixed lubrication.

Publ: Automotive Engineering v85 n11 p56-9 (Nov 1977)
1977
Based on SAE-770835, "Fuel Economy--Contribution of the Rear Axle Lubricant," by P. A. Willermet and L. T. Dixon.
Availability: See publication

HS-021 612

WHAT ARE THE FUEL ECONOMY POTENTIALS FOR EUROPEAN CARS...?...AND FOR DOMESTIC?

The identification, analysis, and quantification of possible sources on improvements in the fuel consumption of 1974 vehicles within the constraints of 1975 European emission standards were the initial objectives of the study. As a reference, emissions and performances corresponding with engines tuned for best fuel economy were evaluated. Analysis was made of 68 four-passenger sedans powered by 0.6 to 2.0 liter engines for fuel consumption, weight, aerodynamic drag factor, and engine characteristics. To quantify the possible fuel consumption improvements relative to a reference vehicle representative of current European cars, a five-seater sedan powered by a 1.6-2.0 liter, four-cylinder gasoline engine with a four/five speed manual transmission was chosen. The engine proved to be the key to fuel economy, even though aerodynamics, drivetrain, rolling drag, and decreased weight are important. Reduction in fuel consumption is nearly proportional to weight reduction with greater advantages obtained at lower speeds during cruise operations; reduction in fuel consumption with decreased aerodynamic drag factor is much greater for the cruise mode than for urban driving. An engine displacement reduction has nearly twice the influence of the weight reduction on urban fuel consumption. At less than maximum speed, considerable fuel consumption reduction can be gained by numerically low gear box ratios of wheel/engine revolutions. The key to fuel economy in urban driving must remain moderation in acceleration and braking. Improved gasoline, diesel, and stratified charge engines were considered; summaries are given of fuel economies for present and potential improvements. In the study made of four pairs of domestic 1977-model cars, it was found that average city/highway fuel economy can be improved by 4.1% through changes in air/fuel

Based on SAE-770846, "Possible Advances in European Passenger Cars' Fuel Economy," by A. Ciccarone and SAE-770847, "An Investigation of Fuel Economy Potential of Four 1977-Model Vehicles," by R. L. Bechtold and R. D. Fleming.
Availability: See publication

HS-021 613

CONTROLLING MACHINES BY EAR WITH ACOUSTIC FEEDBACK

Acoustic emission, or sound generated by the rapid release of energy in a material under strain, can be detected by a transducer placed on the surface of the object, permitting detection of a machine malfunction; electronic equipment amplifies and processes these signals for monitoring and control. The sound produced at the source propagates as a stress wave throughout the structure and can be detected by sensors placed on the structure several feet from the source; thus an entire structure can be tested with a limited number of fixed sensors. A second major advantage is associated with the dynamic growth of defects; acoustic emission indicates when and where growth is occurring and is effective in assessing structural integrity. Piezoelectric transducers generate about 20 mVdc/g and may respond to frequencies from a few Hz to several hundred kHz, producing input signals for acoustic feedback controllers. Miniaturized solid-state devices are expected to permit logic circuits to be packaged in conventional instrumentation enclosures, without auxiliary computers and processors. One pioneering acoustic-control process developed by Westinghouse Electric Corp. is used on a punch press where it monitors the die sounds and shuts down the press if the signal deviates substantially from the normal signature. A feature of the system is an automatic "learn" mode in which the signature from a good die is stored in the electronic control logic as the threshold reference. Monitoring spot-welds is another example of in-process control; a spot-weld controller made by Trodyne Corp. uses high-frequency acoustic emission to produce consistently good welds without overwelding. Overwelding, always a problem in the industry, is now being compounded by the increased use of galvanized steel, Zincometal, and other coated materials; use of the acoustic feedback controller is expected to produce more consistent welds and improve tool life. Acoustic monitoring is also used in nonproduction applications: by electronic-device makers, to inspect for corrosion in the Air Force F-111 jet fighter, in detecting and pinpointing the location of cracks. Schematic diagrams illustrate the structure of a transducer and the calibration setup, the compensation circuitry developed to maintain a threshold close to a varying background noise level, the weld controller system and method of stopping a faulty press, and the system of detecting wing cracks in a tanker-transport plane.

by John K. Krouse
Publ: Machine Design v49 n24 p146-51 (Oct 1977)
1977
Availability: See publication

sipation typically requires converting kinetic energy into the deformation of some type of energy absorbing system. Of the two principal types of energy absorber, recoverable (such as spring or rubber bumper) and nonrecoverable (converting kinetic energy into heat), the latter are less expensive, highly reliable, and applicable to a wide range of problems. Metal cutting and honeycomb core crushing are the most predictable methods of absorbing shock mechanically. Retarding force is independent of impact velocity, so devices using these processes are easily sized to fit a wide range of requirements. Rod and wire drawing expends energy by reducing the rod or wire diameter and by friction of the rod sliding against a die. Strip bending dissipates energy by plastic deformation of flat metal strips; in general it has not been established that retarding force is independent of velocity for this process, and additional study is necessary to determine the relationship. Tube buckling dissipates energy by forming and collapsing pleats and stretching the circumference of a tube; retarding force for this process depends on both displacement and velocity. The basic steps in designing an energy absorber are to identify the allowable deceleration, weight of object to be stopped, and impact velocity of the object, determine minimum stopping distance, calculate required retarding force, select a method for absorbing the energy, choose material to be used in energy absorber, and compute the geometry of the components in the energy absorbing device, applying the appropriate safety factors. Generally, if the required stopping distance is short, a honeycomb core should be used. Metal-cutting energy absorbers should be used for longer stopping distances. An example is presented and discussed.

by James A. Kirk; Norman Overway
Publ: Machine Design v49 n24 p152-7 (20 Oct 1977)
1977
Availability: See publication

HS-021 615

MATERIALS IN THE 78'S. DETROIT'S DISAPPEARING ACT [AUTOMOBILES]

The need for fuel economy is strongly influencing the design and selection of materials and components for 1978 U.S. cars and trucks. More plastic, aluminum, and high-strength steel will be used, with corrosion-resistant materials, while consumption of conventional steels and cast iron will decline. Major achievements in the 78's will include the largest interior structural foam plastic component to be used in the industry; the first mass-produced aluminum intake manifolds for V-8 engines; a rigid plastic injection-molded total front-end panel; all-aluminum deck lids; and the first nearly all-plastic seats. Three more car lines will have soft-face front-end and rear-end bumper systems; four new cars will have all-aluminum bumpers; new models will include high strength steel door beam applications, galvanized high strength steel components, advance polyurethane primers for sheet molding compounds, a two-piece die cast intake manifold for six-cylinder engines, and a one-piece plastic front end panel with integral hood extension and fender extensions. An almost all-plastic bucket seat will be introduced in the Corvette; the industry's first application of high-strength plastics with 50% to 66% glass con-

1977
Availability: See publication

HS-021 616

SHAKING UP THE ELASTOMER BATTING ORDER [AUTOMOBILE MATERIALS]

Automobile redesign programs focusing on soft, lightweight materials will cause an increase in use of elastomers. Growth is expected to continue in soft front ends, electric fuel metering emissions systems, and rack and pinion shaft coverings. Largest application for urethane elastomers is soft front ends made by the reaction injection molding (RIM) process, which involves the metering of two or more liquid raw materials into a static mixhead attached to a closed mold where they react under little comparable pressure to form a solid polymer. Another flexible fascia system is DuPont's Impact EPDM, a synthetic rubber system whose parts are less affected by temperature change, with a flex modulus up to 100,000 psi (689 MPa), and with tooling better suited for high volume production. Steel molds are used which can be changed to accommodate design changes and shifting Federal standards. In their Silastic Compounding System, Dow Corning reduces cost by supplying bases and modifiers for the molders to mix themselves, rather than supplying nearly complete silicone rubber compounds; this eliminates duplicate mixing by both Dow and the molder, as well as the extensive warehousing costs. Another major area for elastomer expansion is vibration isolation damping. The main problem in the elastomers area is its dependence on the oil industry. If growth continues as expected, usage will increase to a level of 57 to 66 lb (25 to 29 kg) per car in 1985.

by John G. Mohan
Publ: Automotive Industries v157 n4 p18-23 (Sep 1977)
1977
Availability: See publication

HS-021 617

NEW ERA IN SAFETY REGULATIONS

A report is made on serious criticism of the auto industry by Joan Claybrook, a colleague of critic Ralph Nader and President Carter's appointee as head of the National Hwy. Traffic Safety Administration (NHTSA). Alleging that NHTSA itself had accomplished little in mandating new safety standards and instituting safety recall campaigns, Claybrook instituted intensive work on the backlog of potential recalls. Her goals for U.S. cars are crash survivability at 50 to 60 mph (80 or 96 kmh); fuel economy of 40 or 50 mpg (17 or 21 kml); improved side guard beams; full passenger protection in vans and other multipurpose vehicles; car designs that will better protect pedestrians, bicyclists and motorcyclists struck by cars; more energy-absorbing bumpers and, of special importance, inflatable air bags or passive belts. Stricter standards must be applied to vans. Better side impact protection must be provided, and bumper standards improved. Within two years a set of ratings will be developed for each car, comparing their crashworthiness, damage susceptibility, and ease of repair. Periodic motor relat.
justme...
speed. Stor.
mining the fue
facturers meet
becoming a bigge
year and the chance
change in the fuel economy standards on 1978 cars is that the aerodynamics or frontal area of each car will be factored into the equation for determining its fuel economy. Another change to improve the test accuracy will be that the inertia weight classes will be separated by 125 lb (56.7 kg) for lighter cars and 250 lb (113.4 kg) for heavier cars, instead of present classifications. EPA will stick to the present test of running a car on a dynamometer and measuring its emissions. Tests will also be run to check emission performance under conditions other than the usual fairly moderate ambient temperatures. Further regulations will be evolved to close loopholes used by the auto companies. A program of Selective Enforcement Auditing, checking a statistically significant portion of total car production for emissions at the end of the assembly line, helps to enforce quality control. The Sealed Housing Evaporative Determination test requires more extensive evaporative emission control systems, measuring all the hydrocarbons, including those from the paint and other body components that are emitted by a new car.

by Joseph M. Callahan
Publ: Automotive Industries v157 n5 p23-6 (15 Sep 1977)
1977
Availability: See publication

HS-021 619

INTRA-ACCIDENT CORRELATIONS OF DRIVER INJURY AND THEIR APPLICATION TO THE EFFECT OF MASS RATIO ON INJURY SEVERITY

Data on the severities of the injuries to the drivers involved in two-vehicle crashes are presented and related to the relative

tion is given of the injuries to the two drivers in head-on accidents in rural areas in Great Britain, mass ratio 0 0.90-0.99. Factors such as increasing speed that increase the likelihood of death in an accident will also increase the likelihood of serious injury, and will reduce the chance of escaping without injury. A method is summarized of quantifying this interrelationship between the probabilities of fatal, serious, slight, and no injury. A statistical model is proposed for analyzing tables of the type described; the model is applied to data relating severity of injury to the ratio of the masses of the vehicles involved in two-vehicle accidents.

by T. P. Hutchinson
Publ: Accident Analysis and Prevention v9 n3 p217-27 (Sep 1977)
1977; 8refs
Supported by Transport and Rd. Res. Lab.
Availability: See publication

HS-021 620

A NEW TRAFFIC PERCEPTION TEST ON THE BASIS OF THE LOGISTIC TEST MODEL

Measurement of perceptual capacity is of decisive importance in assessing the psychological aptitude of drivers. To test individual differences in perceptual capacity, a new test was developed in Vienna which measures the quick structuralization of complex traffic situations. This slide series combines the advantages of the "Cologne Series" (multiple choice format, allowing group testing) with the advantages of the "Viennese Series" (complete grasp of complex traffic situations). The "logistic test model" from RASCH was tested empirically and was found to apply well to the data; one single dimension was sufficient to explain individual differences in test performance. The data from 291 subjects from a heterogeneous population (students, police trainees, and a sample of subjects sent by the official doctor for a traffic-psychological examination) were used in the empirical analysis. Due to the model used, it was possible to construct two homogeneous parallel subtests and to produce a table for the conversion of results from each of the three tests into each other. The precision of test results was described by means of confidence intervals of the person parameters and in addition by the so-called "information functions." Because the attainment of an overall view in traffic situations is one-dimensional and can therefore be measured by a single score, this test is of practical value: it can be used to discover perceptual weakness in drivers, to improve perceptual achievement, and to measure changes in perceptual performance, e.g. for the study of drug effects.

by Gerhard H. Fischer; Peter Kowar
Publ: Accident Analysis and Prevention v9 p203-15 (Sep 1977)
1977; 12refs
Availability: See publication

tions below 50 mg% were studied in Sweden in two contexts: in a critical car driving situation involving emergency braking and evasive maneuvers, and in a surprise situation following the first one, featuring the sudden appearance of a man-shaped obstacle blocking the roadway. A pilot study with six subjects and a target blood alcohol concentration (BAC) of 50 mg% was followed by two main experiments with ten subjects in each and target BAC's of 50 mg% and 30 mg% respectively. Subjects served as their own controls by performing one night without alcohol and the next night with alcohol. Results indicate that the detrimental effects of alcohol appear at a total BAC average of 42 mg%. In the braking and maneuvering task, drivers under the influence of alcohol hit significantly more pylons and took significantly longer distances to stop. There was also a strong tendency for alcohol to impair performance in the surprise situation: under the influence of alcohol, five drivers out of ten collided with the obstacle, whereas only one of ten did so in the control situation. There were tendencies for ranges to be wider and for maximum and minimum values to be higher in the alcohol condition than in the control condition. Results probably underestimate rather than overestimate the true differences in driver performance in emergency situations.

by Hans Laurell
Publ: Accident Analysis and Prevention v9 n3 p191-201 (Sep 1977)
1977; 28refs
Availability: See publication

HS-021 622

DRINKING AND DRIVING IN HELSINKI [FINLAND]

A roadside survey of drivers in Helsinki, Finland, was conducted to determine the prevalence of drinking drivers as well as their drinking patterns and demographic characteristics, the characteristics of their vehicles, and the reliability and usefulness of the two types of breath alcohol analyzers on the road. Three different samples of late evening and early morning traffic going from downtown toward the suburbs yielded 7002 drivers investigated, of which 1700 were interviewed. There were 55 or 0.8% breath alcohol positive (BAP) drivers. Almost a quarter of these did not possess a valid driver's license, their licenses often having been revoked because of previous drinking and driving offenses. The Finnish BAP drivers drink more hard liquor and more often than the rest of the driving population. The very punitive Finnish legislation concerning drinking and driving, which is probably generally effective, is ineffective in dealing with repeated offenders, who represent a difficult alcohol problem. Correlation between BAL's as measured by the routine Widmark/Alcohol dehydrogenase method and the ASD-meters was 0.81; correlation between the BAL's and the results of the Alc-meters was 0.88.

by M. Maki; M. Linnoila; A. Alha
Publ: Accident Analysis and Prevention v9 n3 p183-9 (Sep 1977)
1977; 20refs
Availability: See publication

ing systems: the moving-stopping test (MST) and the wheel pull inspection (WPI). Pass/fail decisions were made for 2465 vehicles by each method independently. The statistical methodology was developed, and the brake testing data analyzed. It was found that the procedures agreed only weakly, and that the agreement varied with certain pass/fail criteria. The moving-stopping test was more stringent than the wheel removal inspection but was less sensitive.

by Richard F. Corn; J. Richard Landis; Jairus D. Flora
Contract MVI-75-001A
Publ: Accident Analysis and Prevention v9 n3 p167-76 (Sep 1977)
1977; 10refs
Availability: See publication

HS-021 624

A DECISION-THEORY MODEL OF DANGER COMPENSATION

A utility maximization model is made of rational speed choice by a driver which predicts the direction of change of the accident rate in response to a given environmental safety improvement. The model assumes that the driver has certain stable goals and makes decisions to maximize the expected value of these goals, and that the driver is an accurate judge of the accident probability resulting from each mode of behavior. Any continuous behavior such as choice of a minimum acceptable passing gap or degree of attention or vigilance during driving in which a goal is sought at the risk of a rare event can be analyzed in the same way. In the model, the direction of change of the accident rate depends on the shape of the functions relating speed and accident rate before and after the safety change, but not on the driver's utilities for speed or accidents. A consequence of this is that either all drivers should increase their accident rate or all should decrease it, in spite of variations in utilities. The fact that rational drivers may react so that accidents may increase or decrease underlines the need for taking danger compensation into account when introducing a safety change.

by Barry O'Neill
Publ: Accident Analysis and Prevention v9 n3 p157-65 (Sep 1977)
1977; 16refs
Availability: See publication

HS-021 625

STATE AND FEDERAL NEW-CAR SAFETY REGULATION: EFFECTS ON FATALITY RATES

Car occupant and pedestrian fatalities per 100,000 cars registered in Maryland were calculated for the calendar years 1972-1975, in order to show the net effect of the state safety belt installation law and Federal standards on those rates. The study is superior to earlier studies in that it adequately separated vehicles subject to state and Federal automobile safety standards from other vehicles operated on the roads in exactly the same periods. Of the 2880 fatalities studied, 60% state law (1964-1967 models), as well as some crash protection installed in relation to standards required of cars sold to the government (mainly 1967 models), averaged 35 occupant deaths per 100,000 registered cars, 20% less than pre-1964 cars. For federally regulated (post-1976) cars, occupant deaths averaged 27 per 100,000 cars yearly, 23% less than 1964-1967 models and 39% less than pre-1964 models. The differences were unrelated to driver age. No consistent differences in the rates at which they killed pedestrians were found among unregulated, state regulated, or subsequent federally regulated cars. Thus there is no evidence to support the contention that increased occupant protection resulted in increased hazard to pedestrians.

by Leon S. Robertson
Publ: Accident Analysis and Prevention v9 n3 p151-6 (Sep 1977)
1977; 18refs
Sponsored by Insurance Inst. for Hwy. Safety.
Availability: See publication

HS-021 626

GUIDELINES FOR THE MEASUREMENT OF INTERSTATE MOTOR CARRIER NOISE EMISSIONS

A manual designed for use by Dept. of Transportation field safety investigators gives a basic understanding of the measurement of sound, particularly from motor vehicles, and of the provisions and requirements of the Federal interstate motor carrier noise emission regulations. Basic concepts are that sound levels decrease (or increase) by 5 dB for each doubling (or halving) of distance from a sound source on a test site clear of reflecting surfaces and other contributing sources, and that sound levels increase (or decrease) by 3 dB for each doubling (or halving) of the number of sound sources or contributors. The function, operation, and use of sound level meters, calibrators, windscreens, and other devices are described. The ideal site for testing is diagrammed, and common site characteristics are described. Bureau of Motor Carrier Safety standards and Environmental Protection Agency standards are given for standard stationary test sites, highway test sites, hard and soft sites, and nonstandard sites; typical examples of testing sites are presented in photographs. Chapters are included on determination of correction factors, pretest preparation, visual inspection, and measurement procedures. The basic standards for highway operations are 86 dB(A) on highways with a speed limit of 35 mph or less and 90 dB(A) at speeds of 35 mph or higher, the measurement being made at a distance of 50 ft from the centerline of the lane of travel. The basic standard for the stationary test is 88 dB(A), also measured at a distance of 50 ft. Allowable tolerances are described. A description of the violation citation procedure includes detailed instructions for completing form MCS-141, Noise Level Compliance Check. A glossary of terms and availability of instrumentation are appended.

Michigan Acoustical Consultants, P.O. Box 113, Milford, Mich. 48042
Contract DOT-FH-11-9061
Rept. No. FHWA-TS-77-222; 1977?; 99p
Availability: Federal Hwy. Administration, Bureau of Motor Carrier Safety

devised for extending it, based on firm empirical evidence and sound theoretical specification. Data sources to date include the annual report of the Federal Hwy. Administration (FHWA), "Highway Statistics," the Nationwide Personal Transportation Survey also sponsored by the FHWA, and a number of metropolitan transportation studies. These sources yield VMT of questionable value, and the cost effectiveness of further modeling efforts based on them is also questionable. Current models of VMT forecasting are evaluated including the Transportation Systems Center (TSC) model, the RAND Corp. model, and the Chase econometrics model. All these models suffer from a common set of drawbacks: interaction between auto stock and VMT has not been adequately explored, current models are likely to have biased parameter estimates because of omitted simultaneous relationships, and cross elasticities of VMT with respect to the price and availability of competing modes of travel remain unknown. Questions to be answered include whether VMT reflects a basic or a derived demand, whether it is an independent demand or is part of a simultaneous system of relationships, and whether demand for auto travel is affected by competing modes. A VMT model should include the classic economic phenomena of income elasticity, price elasticity, and cross elasticities for competing goods; should use different variables of income effects for microlevel and macrolevel; should allow for fuel economy as well as gas price; should include price of public transit as a variable; and should include such physical and social indices as density of population, road quality, form of employment, and household size. The recommended short-term strategy is modification of the TSC model in the following ways: deletion of the lagged VMT term; inclusion of price or availability variables for competing modes; inclusion of a highway availability variable; replacement of the number of drivers with driving-age population; and addition of unemployment rate. Recommended intermediate-term strategies include microscale modeling with the Nationwide Personal Transportation Survey data and new analysis of the FHWA data on a cross-sectional as well as a time-series basis. Recommendations for long-term strategies include collection of better information by a repetitive survey based on multistage probability sampling. Such a survey would differ from the National Personal Transportation Survey in that it would measure auto travel directly through odometer readings, with repetitions. Data for each household should include information on auto travel and ownership, demographic and economic characteristics, and geographic location of residence. The data base developed would provide the first accurate measurement of personal auto travel, the best means of estimating national aggregate VMT, and a complete source of information for analyzing in detail the interactions of auto travel and ownership, new and used car sales, and price structures and elasticities. Labor and cost estimates are made for each recommended strategy.

by F. T. Rabe
Environmental Impact Center, Inc., 55 Chapel St.; Newton, Mass. 02158
Contract DOT-TSC-1059
Rept. No. DOT-TSC-OST-77-25; 1977; 54p 13refs
Rept. for Jul-Sep 1975.
Availability: NTIS

considered include the following: materials consumption the automobile manufacturing industry; automobile deregis tion; disposal of obsolete automobiles; the automol wrecking industry; the scrap industry; and materials recov from junked automobiles. Also considered are public polic which affect material reclamation from junked automobi and future trends in the reclamation of materials from junk automobiles. There is an established and functioning comm cial system of automobile scrappage; flow of junk cars limited by the market price of ferrous scrap, which price more than doubled in recent years. The national problem of ever increasing accumulation of automobile hulks has b solved. Of the 118 million automobiles which will have b retired from service between 1958 and 1975, 87% plus minus 10% will have been reclaimed and converted into use scrap; the rate for those autos deregistered between 1972 1975 is 98% plus or minus 10%. The shredder has been u increasingly; the scrap it produces is of high quality. The mand for ferrous scrap has increased because of the increa use of the electric furnace by the iron and steel industry. O 30% of the ferrous scrap derived from auto hulks is expor from the U.S. The value of the nearly 10 million tons recovered metals from junk automobiles in 1974 was $941 m lion; 24% of that amount was due to recovery of nonferr metals which comprised only 8.2% of the total weight. solete metals are more effectively recovered from junked tomobiles than from any other post-consumer products. At present time, the nonmetallic components of junk autos not being commercially reclaimed. The composition of a ty cal automobile did not vary significantly from 1960 to 19 The typical automobile of the past 20 years has a mean life 9.7 years with a standard deviation of 3.6 years; thus number of autos being retired can be predicted from re sales of earlier years.

by R. Kaiser; R. P. Wasson; A. C. W. Daniels
H. H. Aerospace Design Co., Inc., Civil Air Terminal, Bedford, Mass. 01730
Contract DOT-TSC-1028
Rept. No. DOT-TSC-OST-77-11; 1977; 408p 33refs
Rept. for Jun-Dec 1975.
Availability: NTIS

HS-021 629

THE DEVELOPMENT OF A 150 KW (200 HP) STIRLING ENGINE FOR MEDIUM DUTY AUTOMOTIVE APPLICATION--A STATUS REPOR

The prototype was a small 40 kW (55 hp) experimental eng of V4 configuration, the latest version of which is the V4 engine presently under installation in a Ford Taunus car power control tests. Its component development, temperat and air/fuel control, starting sequence, and engine tor response are described, as are its installation in a Ford Pi and in the Ford Taunus. As for the P150 engine, the main p ject, five prototypes of its V4 module have been built. Th different heater geometries are under evaluation: the to type with horizontal double row heater tubes connected to tical manifolds; the temple type with vertical heater tubes manifolds on top; and the envolute type with curved first

that of the indirect injection, high speed Diesel engine. A calculation is presented concerning total operating cost and payback time for a 13 ton delivery truck operating at a 50% intracity/50% intercity driving cycle. The analysis shows a savings in operating cost of the Stirling engine, to be compared with its higher first cost.

by N. Kaj G. Rosenqvist; Stig G. Gummesson; S. Gunnar K. Lundholm
KB United Stirling AB and Co., Sweden
Rept. No. SAE-770081; 1977; 12p 5refs
Presented at International Automotive Engineering Congress and Exposition, Detroit, 28 Feb-4 Mar 1977.
Availability: SAE

HS-021 630

DESIGN CONSIDERATIONS ON A THERMAL ENERGY STORAGE STIRLING ENGINE AUTOMOBILE

A high-temperature, thermal energy storage unit has been built in which, for the heat transport, use is made of the heat pipe principle. Its performance in a commuter car equipped with a swash plate Stirling engine is being studied. Description is given of the thermal energy storage unit, its storage material and design, and its behavior in testing. Damage to the outer wall of the unit does not create any danger for the environment since the sodium is still retained by the porous structure. The salt should be divided into small volumes so that, in case of container damage, only a small quantity of salt will escape. Heating from room temperature with full load on the heater elements is possible without causing these elements to boil dry, since the permanent presence of inert gas in the heat pipe system gives rise to a heat front which does not start to move until the temperature exceeds 400° C. The thermal energy storage unit is isothermal when the temperature in the heat pipe system exceeds 550° C. The use of less expensive fluoride salts which are technically pure is possible if the oxygen, water, and hydrogen fluoride which they contain are removed. Protection against corrosion can be achieved by adding a small amount of aluminum rather than ammonium fluoride to the melt. For applications in which the heat content per unit weight is less important than that per unit volume, it is advantageous to base the construction on a higher minimum operating temperature: an increase from 550° C to 600° C results in a 19.6% increase in the energy density on a volume basis. On a weight basis the decrease is 6%. The zero pollution city car described can have a very acceptable range and acceleration.

by G. A. A. Asselman; C. L. Spigt; R. J. Meijer
Philips Res. Labs., Holland
Rept. No. SAE-770080; 1977; 15p 7refs
Presented at International Automotive Engineering Congress and Exposition, Detroit, 28 Feb-4 Mar 1977.
Availability: SAE

including: testing of the tapeswitch system for determining vehicle speed and lateral placement; speeds and service on multilane upgrades; and passenger car equivalencies of trucks, buses, and recreational vehicles for two-lane rural highways. Study is made of location bias in speed-volume relationships for two-lane arterial roadways, and capacity evaluation is made of two-lane, two-way highways by simulation modeling. Methods are compared of determining intersection service level, and measurement of delay by sampling queue backup is studied. Relationship of signal design to discharge headway, approach capacity, and delay is considered, as is the Berger-Robertson method for measuring intersection delay. Other papers consider weighing in motion in California, nonlinear truck factor for two-lane highways, measures of pedestrian behavior at intersections, and bus priority system studies using instrumented buses.

by Dolores Breslaw, ed.
National Acad. of Sciences, Transportation Res. Board, Washington, D.C.
Rept. No. TRR-615; 1976; 66p refs
Prepared for the 55th annual meeting of the Transportation Res. Board. Sponsored by TRB Group 3, Operation and Maintenance of Transportation Facilities. Includes HS-021 632--HS-021 638.
Availability: Corporate author, $2.80

HS-021 632

SPEEDS AND SERVICE ON MULTILANE UPGRADES [TRAFFIC]

A sample of design guides for operating speeds and service levels on grades for one-way, multilane traffic including trucks is based on computer simulation supported by field data. The microscopic simulation model is for unidirectional flow on two or three lanes; it duplicates multilane flow features in such situations as free-flowing to congested conditions in level terrain, on grades, in the transition regions at grade feet and crests, and at climbing lane additions and drops. Results confirm a basic postulate of traffic engineering that the operating speed and passenger vehicle average speed, when plotted against flow rate, exhibits a characteristic shape. Capacity flow is diminished by slow trucks. Design chart sets are presented for two upgrade lanes on a facility with 121 km/h design speed. They are applied to the following estimations: freeway service level and operating speed on a 2% sustained grade with 10% trucks in a mixed flow of 1800 vehicles per hour, and maximum flow for service level C' on a rural multilane highway for a 4% sustained grade on which the flow will contain 15% trucks. Weight factors are derived for adjusting other truck populations to the reference population. A graph provides a means for assigning weight factors to trucks without first equating them to a truck type. Capacity can be calculated for a design or projected flow. Flow characteristics in rolling terrain should be equivalent to a sequence of foot and crest transition flows. The user of the design charts should bear in mind that the charts provide estimates for traffic conditions in relatively short sections of highway, 300 to 600 m, and thus the speeds used are the local speeds and not speeds averaged over the entire grade. The estimated capacities are

the flow characteristics on short sections to the flow rate and vehicle population is two to three minutes. The design charts can be used with an hourly flow rate; the truck population is averaged for the hour to give an estimate of the average operating conditions for the hour.

by A. D. St. John; William D. Glauz
Midwest Res. Inst., Kansas City, Mo.
Publ: HS-021 631 (TRR-615), "Capacity and Measurement of Effectiveness," Washington, D.C., 1976 p4-9
1976; 7refs
Sponsored by Transportation Res. Board Com. on Hwy. Capacity and Quality of Service.
Availability: In HS-021 631

HS-021 633

PASSENGER CAR EQUIVALENCIES OF TRUCKS, BUSES, AND RECREATIONAL VEHICLES FOR TWO-LANE RURAL HIGHWAYS

Study of the effects that recreational vehicles have on highway capacity is based on predicting performance of recreational vehicles by a linear equation whose coefficients are related to vehicle characteristics. Such characteristics include maximum acceleration capability, maximum speed, power, weight, rear axle and transmission gear ratios, drag coefficient, frontal area, and air-mass density. Passenger car equivalents (PCE's) are derived for recreational vehicles, trucks, and buses on two-lane highways on specific, individual subsections or grades. Average, generalized PCE's of trucks, buses, and recreational vehicles on two-lane highways over extended section lengths are tabulated. Calculating highway capacity over extended section lengths requires accurate classification of the highway section under consideration. Work in applying derived adjustment factors to a field site and in carrying out sensitivity testing in highway capacity computations produced strong evidence that the new adjustment factors and those for trucks and buses contained in the 1965 Highway Safety Manual may not be valid and may require further refinement.

by Al Werner; John F. Morrall
Alberta Transportation, Edmonton, Alta., Canada; University of Calgary, Alta., Canada
Publ: HS-021 631 (TRR-615), "Capacity and Measurement of Effectiveness," Washington, D.C., 1976 p10-7
1976; 6refs
Sponsored by Transportation Res. Board Com. on Hwy. Capacity and Quality of Service. Discussion and authors' reply are appended.
Availability: In HS-021 631

HS-021 634

CAPACITY EVALUATION OF TWO-LANE, TWO-WAY HIGHWAYS BY SIMULATION MODELING

A microscopic Monte Carlo simulation model of a two-lane, two-way highway was used to evaluate capacity more accurately. The model, SIMTOL, operates by processing individual Satisfactory agreement is obtained between the manual operating speed-volume to capacity ratio curve and a similar relation obtained from model runs. Poorer agreement is obtained between the manual truck equivalency factors for two-lane, two-way roads and similar factors derived from model runs. The manual may overestimate the adverse effects of trucks on steeper grades.

by William A. Stock; Adolf D. May
JHK and Associates, San Francisco, Calif.; University of California, Inst. of Transportation and Traffic Engineering, Berkeley, Calif.
Publ: HS-021 631 (TRR-615), "Capacity and Measurement of Effectiveness," Washington, D.C., 1976 p20-7
1976; 17refs
Sponsored by Transportation Res. Board Com. on Hwy. Capacity and Quality of Service.
Availability: In HS-021 631

HS-021 635

MEASURING DELAY BY SAMPLING QUEUE BACKUP [TRAFFIC]

The relation of sampling of queue backup and delay at signalized intersections was studied and evaluated for use as a level-of-service indicator for intersection performance. Time-lapse photography was used at four urban intersections controlled by pretimed signals to determine time-in-queue delay. At the same time, each field observer sampled the position of the rear of the queue in one lane at ten-second intervals. Other field methods of measuring delay were also tested. Regression analyses of resulting delay values by cycle yielded high correlations between queue backup delay from field sampling and time-in-queue delay from film analysis. Field sampling of queue backup was found to be much simpler to use in the field than field sampling of stopped time delay. Field sampling was confined primarily to three unsaturated approaches that had few left-turning vehicles. Further study is needed to validate and refine field procedures under a wider range of conditions.

by Martin G. Buehler; Thomas J. Hicks; Donald S. Berry
Lake County Hwy. Dept., Ill.; Richard P. Browne Associates; Northwestern Univ.
Publ: HS-021 631 (TRR-615), "Capacity and Measurement of Effectiveness," Washington, D.C., 1976 p30-6
1976; 11refs
Sponsored by Transportation Res. Board Com. on Hwy. Capacity and Quality of Service.
Availability: In HS-021 631

HS-021 636

RELATIONSHIP OF SIGNAL DESIGN TO DISCHARGE HEADWAY, APPROACH CAPACITY, AND DELAY [TRAFFIC]

A nationwide program of empirical testing was undertaken to determine the absolute values of the queue discharge headway distribution and the influence of various factors on this distribution, emphasizing how number, size, and location of traf-

mm lenses. Results show that, except for lens size, no class of configuration can be considered better than any other for any queue position; the 300 mm size lens performed better for all queue positions. Estimates are tabulated of expected delay and approach capacity as functions of configuration class and lens size. All post and mixed configurations accrue more delay for all four queue lengths. When the queue lengths are reached, the better performance of overhead configurations, both single and multiple, becomes more apparent. Computed capacities as a function of cycle length for two lens sizes and three basic configuration classes are tabulated.

by Gerhart F. King; M. Wilkinson
KLD Associates, Inc., Huntington Station, N.Y.
Publ: HS-021 631 (TRR-615), "Capacity and Measurement of Effectiveness," Washington, D.C., 1976 p37-44
1976; 10refs
Sponsored by Transportation Res. Board Com. on Hwy. Capacity and Quality of Service. Discussion and authors' reply are appended.
Availability: In HS-021 631

HS-021 637

NONLINEAR TRUCK FACTOR FOR TWO-LANE HIGHWAYS

A microscopic simulation model for traffic flows on two-lane, two-way highways was developed to include all important factors known to affect these flows: acceleration and speed capability limits; driver performances; overtaking and following characteristics; acceptance or rejection of passing opportunities; vehicle lengths; passing maneuvers; passing sight distance; and multiple passes. The model assumes that vehicles slow down to negotiate horizontal curves having both curvature and superelevation, that flying passes are permitted, that passing maneuvers can be aborted, and that trucks use crawl speeds to descend sustained grades of 4% and steeper. Results of the simulation were in agreement with field data and were applied to flows in level terrain, in rolling terrain, and on sustained grades. The truck factor, currently of linear form, should be nonlinear. A nonlinear form was derived and successfully applied to summarize results for a variety of terrains and vehicle populations.

by A. D. St. John
Midwest Res. Inst., Kansas City, Mo.
Publ: HS-021 631 (TRR-615), "Capacity and Measurement of Effectiveness," Washington, D.C., 1976 p49-53
1976; 5refs
Sponsored by Transportation Res. Board Com. on Traffic Flow Theory and Characteristics, American Assoc. of State Hwy. Officials, and Federal Hwy. Administration.
Availability: In HS-021 631

HS-021 638

MEASURES OF PEDESTRIAN BEHAVIOR AT INTERSECTIONS

Two field studies and a series of field observations were conducted to identify both operational and conflict measures as procedures were pilot tested at nine pairs of intersections; results are tabulated. The pedestrian behaviors found significantly to differentiate the high from the low accident intersections in a pair were the following: being in traffic lane while a vehicle going straight moves through crosswalk; entering a traffic lane while an unrestricted vehicle approaches within one block; and running in a traffic lane in response to a vehicle hazard. This differentiation was based on the frequency of the behavior to be higher at the high accident site. The running behavior also separated the high from the low sites on the basis of the percentage of that behavior to occur at each site. Other promising behavioral measures include the following: a backup movement after beginning to cross; being within 6 m and in the path of a turning vehicle; and running in a traffic lane in response to a turning vehicle or a potential turning vehicle.

by Wallace G. Berger; H. Douglas Robertson
U.S. Senate Staff; BioTechnology, Inc., Falls Church, Va.
Publ: HS-021 631 (TRR-615), "Capacity and Measurement of Effectiveness," Washington, D.C., 1976 p54-9
1976; 3refs
Sponsored by Transportation Res. Board Com. on Effectiveness of Operational Measures.
Availability: In HS-021 631

HS-021 639

ALCOHOL SAFETY ACTION PROJECT (ASAP) FOR BOSTON, MASSACHUSETTS. 1973 ANNUAL REPORT, SECTION 3

Tabulated data are presented for total project impact as measured by roadside and household surveys, crashes of various categories, and blood alcohol content of fatalities and arrestees. Other data concern program status reports, activities, and financial information for the enforcement, judicial, rehabilitation, and public information and education activities of the Boston, Mass., Alcohol Safety Action Proj.

Boston Alcohol Safety Action Proj., 211 Congress St., Boston, Mass. 02110
Contract DOT-HS-075-1-098
Rept. No. Annual-Report-1973-Sec-3; 1974?; 101p
Section 1 is HS-021 640.
Availability: Reference copy only

HS-021 640

ALCOHOL SAFETY ACTION PROJECT (ASAP) FOR BOSTON, MASSACHUSETTS. ANNUAL REPORT 1973, SECTION 1

The report contains a description of the Boston, Mass., Alcohol Safety Action Proj. (ASAP) community, statement of program objectives, description of the program, description of the management information system, a summary of overall progress, and performance reports of the various specific countermeasure activities. Description of the ASAP community is given mainly by demographic, vehicle, and fiscal statistics, and by a listing of ASAP community facilities and the legislation concerning driving while intoxicated. Manage-

ment information systems are described for the probation and enforcement programs; summary forms and charts are presented. The abstract of the annual report shows that while overall decrease in fatalities was 18.2%, that of the area covered by the Boston Police Dept. was 34.7% and that of the area covered by the Metropolitan District Commission (MDC) Police was 56.2%. The Boston Police had doubled their arrests of drinking drivers whereas the MDC arrests had not increased. There was a direct connection among ASAP enforcement activities, catalytic impact on Boston, and reduction in fatal crashes. Boston district courts cooperated with the program, and the media were supportive. Successful prosecution and disposition of drinking driver cases showed a 60% increase. Of those referred to rehabilitation, 81% were problem drinkers. Arrest recidivism has been only 3%. The most important catalytic effect of ASAP was the establishment of nine other ASAP areas in the state; together with Boston they account for almost half of the state's arrests of drinking drivers.

Boston Alcohol Safety Action Proj., 211 Congress St., Boston, Mass. 02110
Contract DOT-HS-075-1-098
Rept. No. Annual-Report-1973-Sec-1; 1974?; 61p 3refs
Section 3 is HS-021 639.
Availability: Reference copy only

HS-021 641

ALCOHOL SAFETY ACTION PROJECT FOR BOSTON, MASSACHUSETTS, 1974 ANNUAL REPORT. SECTION 3

Tabulated, quarterly data are presented for the following aspects of the Boston, Mass., Alcohol Safety Action Proj. (ASAP) during 1974: total project impact; crashes of various types including single-vehicle, multivehicle, and pedestrian and whether fatal or injurious; blood alcohol levels of drivers arrested and for those killed; program status reports; license records; financial and personnel records; rehabilitation, reeducation, judicial, and enforcement activities; and medical and psychological diagnosis of clients referred.

Boston Alcohol Safety Action Proj., 211 Congress St., Boston, Mass. 02110
Contract DOT-HS-075-1-098
Rept. No. Annual-Report-1974-Sec-3; 1975; 106p
Availability: Reference copy only

HS-021 642

MODIFICATION OF THE MASSACHUSETTS DRUNK DRIVING LAWS. A CASE STUDY OF HOW MAJOR TRAFFIC SAFETY LAW REVISION CAN BE ACHIEVED

Chapter 647 of the Massachusetts Acts of 1974, relating to drunk driving, has as its major change the creation of an alternative judicial disposition for cases of operating under the influence of intoxicating liquor that involve participation and cooperation by an offender in a program of alcohol education, and treatment if necessary. Such a program would be in exchange for reinstatement of the operator's license after 90 days in the case of a first offense. The state legislature established a special commission in 1973 to study the problem of drunk driving; the commission had to consider the merits of loss of license, restriction of license, and rehabilitation programs. Data considered included the experience of the Boston, Mass., Alcohol Safety Action Proj. (ASAP) in probation and rehabilitation and the penalties set by other states for drunk driving. The commission had to decide whether the authority for early reinstatement of an offender's license should be judicial or administrative, and whether an early reinstatement program should be applicable after the first offense. The final form of the bill compromises between punitive and rehabilitative approaches to drunk driving. The continuance without a guilty finding is to be considered the exception to the general rule of conviction and license revocation. Probation is to involve participation in a driver alcohol education program and, in some cases, also in a program of alcohol treatment or rehabilitation. Responsibility for such education programs is given to the Director of the Div. of Alcoholism. There is to be a program fee of $200. Only first offenders (in a six-year time span) are eligible for early license reinstatement. Reinstatement requests are handled by a court hearing. As a monitoring provision, the court can again revoke the license if the offender's driving is dangerous. Other states which have recently changed their penalties for drunk driving include Vermont, Rhode Island, Maine, Nebraska, Indiana, Florida, Utah, North Carolina, and Mississippi. Connecticut, Arizona, and Virginia have established new policies for administering existing laws. States which have had flexible disposition of drunk driving offenders include California, New York, Maryland, New Jersey, Louisiana, and New Hampshire. Sweden has also made legislative changes in the direction of shorter terms of license loss. The Massachusetts law combines the elements of presentence investigation, probation supervision, driver alcohol education, treatment, and rehabilitation, together with an appropriate incentive.

by Sheila Mondshein
Boston Alcohol Safety Action Proj., 211 Congress St., Boston, Mass. 02110
Contract DOT-HS-075-1-098
Rept. No. Analytical-Study-4; 1975?; 36p refs
Availability: Reference copy only

HS-021 643

BOSTON ALCOHOL SAFETY ACTION PROJECT. ALCOHOL RE-EDUCATION PROGRAM

Evaluation is made of the Boston, Mass., Alcohol Safety Action Proj. (ASAP) Alcohol Re-Education Program during 1973. Data are presented on the demographic characteristics of the students, a statistical summary is given of the program, attendance records are tabulated, and the Marcus Alcoholism Questionnaire results are presented and analyzed. Attendance data show an increase of 10.2% in the attendance rate for the last five months of the year over the first seven months. Analysis of questionnaire results shows that, out of a maximum of 1071 possible attitude changes, there were 800 or 74.8% actual significant changes. Of those changes, 510 or 63.7% were towards more positive attitudes. The gross factor score for all factors was 1157.5. The scores of the changes towards positive attitudes totaled 757.25 or 65%, while the scores of the negative changes were 400.25 or 35%. Indicative of the beneficial effects of the program is the positive change of 1.30 on the

Contract DOT-HS-075-1-098
Rept. No. Analytical-Study-6; 1974; 67p
See also HS-802 733 and HS-021 645.
Availability: Reference copy only

HS-021 644

BOSTON ALCOHOL SAFETY ACTION PROJECT. PRELIMINARY RESULTS, HOUSEHOLD SURVEY

Boston Alcohol Safety Action Proj., 211 Congress St., Boston, Mass. 02110; Becker Res. Corp.
Contract DOT-HS-075-1-098
1972; 42p 2refs
For abstract of complete report, see HS-802 734.
Subcontracted to Becker Res. Corp. Rept. for Dec 1971-Jan 1972.
Availability: Reference copy only

HS-021 645

BOSTON ALCOHOL SAFETY ACTION PROJECT. ALCOHOL SAFETY RE-EDUCATION PROGRAM. ANALYTICAL STUDY

The Boston, Mass., Alcohol Safety Action Proj. (ASAP) has a mandatory Alcohol Safety Re-Education Program for all drunk driving offenders placed on probation to ASAP. The program consists of seven biweekly, two-hour sessions taught according to an outline curriculum guide (appended). Classes are kept to 10 or 15 students, and are conducted in an objective, nonjudgmental, and supportive atmosphere. Evaluation is to be made by administering the Marcus Alcoholism Questionnaire (appended) at the beginning and at the end of the program. The goals of the program are to present each student with the necessary factual information on alcohol and alcoholism, to provide some techniques for applying that information to his own attitudes and behavior, and to provide an opportunity and a method for the student to decide to upgrade his life style.

by Lewis B. Sheen
Boston Alcohol Safety Action Proj., 211 Congress St., Boston, Mass. 02110
Contract DOT-HS-075-1-098
(n.d.); 85p
See also HS-802 733 and HS-021 643.
Availability: Reference copy only

HS-021 646

SITE REPORT, BOSTON, MASSACHUSETTS [ALCOHOL SAFETY ACTION PROGRAM]

General site information such as geographic and demographic characteristics of Boston, Mass., legal statutes concerning implied consent and presumptive evidence, and the administrative provisions of the state motor vehicle agency concerning driver licensing, operating without license, suspension or revocation of registration or licenses, illegal operating, and the state driver record system are presented as background material for the Boston, Mass., Alcohol Safety Proj. (ASAP). Other volved in accidents should be reported to the Registry of Motor Vehicles. Statistics should be regional rather than statewide. Consideration should be given to the establishment of separate courts for handling of traffic cases, and to the idea of vesting responsibility for their prosecution with the Office of the City Prosecutor, when drunk driving is involved. Judges and prosecutors should receive specific training in the adjudication of drunk driving offenses. Those police officers who show talent in drunk driving prosecution should be assigned to such work and further trained. Training in handling drunk driving cases should be given to every police officer. Accident records need to be developed and used as a basis for selective enforcement policies.

Boston Alcohol Safety Action Proj., 211 Congress St., Boston, Mass. 02110
Contract DOT-HS-075-1-098
1971; 43p
Availability: Reference copy only

HS-021 647

PREDICTION OF THORACIC INJURY USING MEASURABLE EXPERIMENTAL PARAMETERS

An effort was made to derive and evaluate a simple, nonequivocal measure which can readily assess the crash protective qualities of a candidate seatbelt system, provide a simple, justifiable dynamic test criterion for protection standards generation, and provide both manufacturers and standards monitors an inexpensive, valid method of determination of compliance of system with the mandated performance requirements. Analysis is made of the data obtained from over 100 simulated car crashes in which cadavers were restrained by various types of safetybelt systems. All presently available cadaver test data have been collated and analyzed statistically to determine if any meaningful relationships exist between any of the measured engineering parameters, such as forces, accelerations, deflections, and the physiological consequences (injury) of each test event. Large variations in test instrumentation, test conditions, and belt system configurations utilized by the various researchers limited the analysis to those measured engineering parameters and observed injury evaluations which were common to all the experiments. This very minimal set of event descriptors, when subjected to analysis, has shown injury, defined in this context as the number of observed thoracic fractures, to be a statistical function of the maximum upper torso belt force, cadaver weight, and cadaver age at death. The essential engineering parameter necessary to correlate the performance of a belt system to thoracic injury is the easily measured upper torso belt force. It is recommended that, since injury was defined for the purpose of the study as the number of thoracic fractures, an analysis of the same data should be performed when injury assessments in terms of Abbreviated Injury Scale become available; this would prevent omission from the total injury assessment of the life-threatening injuries to internal organs in the young population where skeletal damage is not so prevalent. Research with cadavers should continue; such design aspects as system geometry, load onset effects, and total trajectory control should all be in-

vestigated and incorporated in a predictive function if proven significant.

by Rolf H. Eppinger
National Hwy. Traffic Safety Administration
1976; 23p 13refs
Availability: Reference copy only

HS-021 648

DUMMY MEASUREMENT AS A SCALE FOR OCCUPANT PROTECTION

Priorities are suggested for the definition of vehicle occupant protection criteria: more statistical information is needed on the type and limits of the injuries and protection criteria for the head, neck, thorax, pelvis, and femur under frontal impact and lateral impact, and for the neck under rear impact. The reproducibility of the measuring instrument dummy must be substantially increased to provide more accurate test data. Although the design and performance criteria for the manufacturing of dummies are very precisely defined, large variations can occur even in testing the same dummy. Examples are given of such variations. The main problems with biomechanic criteria and dummies are concluded to lie in the admixture of research work and compliance testing; there should be a clear differentiation between research and standard compliance. The volunteer, cadaver, and complicated dummy testing should be reserved for research work only. For compliance testing a dummy should be developed based on the research data existing today, with very simple, easily replaceable parts and, instead of the accelerometers used today, impact severity indicators for the chest and head. Femur force measurement should be retained; a new dummy chest should allow the deformation of the chest with a precise measurement technique. The head should have, mounted in the center of gravity, an impact severity indicator, to react to the acceleration time input based on three axis and rotational input. These improvements would promote a valid representation of medically defined injuries to the human road user.

by Ulrich Seiffert; Ruediger Weissner
Volkswagenwerk AG, Res. and Devel. Center, Wolfsburg, Germany
1977?; 20p 13refs
Availability: Corporate author

HS-021 649

SITE REPORT. STATE OF SOUTH DAKOTA [ALCOHOL SAFETY ACTION PROJECT]

The enforcement activities of the South Dakota Alcohol Safety Action Proj. (ASAP) and the available criminal justice resources are studied. State statutes pertaining to the drinking driver are contained in chapter 32-23 of the South Dakota Code (SDCL). The various sections concern driving while under the influence of liquor or drugs, punishment for prohibited driving, and presumptions arising from chemical analysis of body fluids. Also covered are the operation of a vehicle as implied consent to analysis of body fluids, revocation of driver's license for refusal to submit to chemical analysis, and court review of revocation procedures (trial de novo). Recommendations for legislation include requiring all local ordinances to conform exactly with state laws, ending the common practices of probation and license restoration, making the sentence for a first conviction more stringent, identifying habitual users of narcotics or alcoholics in the records system, required chemical analysis on all fatally injured drivers and pedestrians, and permission for police to make drunk driving arrests on reasonable grounds. A review of the Dept. of Motor Vehicles yields the following recommendations: report both the original criminal charge and the final criminal conviction charge to the Commissioner of Motor Vehicles; include a photograph of the driver on the license; provide prior records to the court before sentencing; report nondriving alcohol related convictions to the Dept. of Motor Vehicles; and develop an on-line query capability between the courts and the records system. As for interagency relationships, the most important recommendation is that local police departments be briefed about ASAP. The main law enforcement agencies include the South Dakota Hwy. Patrol, which has five gas chromatographs and a Stevenson Breathalyzer, the Sioux Falls Municipal Police Dept., and the Rapid City Police Dept., in which jurisdiction occurs the highest incidence of drunk driving in the state. Recommendations are made for training, equipment, and deployment of personnel. Statewide accident statistics show a significant reduction in the motor vehicle accident rate between 1969 and 1970. Enforcement statistics are also presented. Legislation should perhaps be made to require uniform crime reporting by all law enforcement agencies in the state; such data should be collated and forwarded to the Federal Bureau of Investigation.

South Dakota Alcohol Safety Action Proj., South Dakota Dept. of Highways, Pierre, S. Dak.
[Contract DOT-HS-045-1-061]
1971?; 63p
Availability: Reference copy only

HS-021 650

REPORT OF A WORKING GROUP ON BIOMECHANICS (EEVC)

The group has been concerned with protection of both restrained and unrestrained occupants, and with pedestrian safety. Recommended tolerance levels are put forward on the best data currently available. With reference to nonsymmetrical frontal impact, protrusions with an area of less than the small impactors that have been used in experimental work should not be placed or created where they could be contacted by restrained occupants. As for lateral impact, measuring the force on a standard dummy would appear to be the best method of assessment, when practical. There was no agreement concerning validity of other methods. In many cases it was not possible to recommend any requirement level; further research is needed in human tolerance levels and in methodology of measuring force and its distribution, thorax deflection, belt strap displacements, and dummies. Measurements with dummies are usually associated with a great deal of scatter in the results. Parameters currently measurable by use of dummies include linear acceleration at the center of gravity of the head in three separate axes, thorax acceleration on the spine in three separate axes, and the femur compressive load. Dummies should be developed so that they can be used to measure femur bending moment, chest deflection, lap strap displacement, and measurement of forces and their distribution. Protection for unrestrained occupants needs to be considered, in spite of mandatory restraint use laws. Consideration of pedestrian accident statistics and data from experimental studies shows that further work is needed on injury mechanisms, the effects on children of protective measures designed for adults, and use of mathematical modeling

techniques. Appended are injury criteria for restrained car occupants, a study of dummies and relevant parameters for standard tests, and studies of protection for nonrestrained car occupants and of pedestrian safety.

by Marc Halpern-Herla
Organisme National de Securite Routiere (ONSER), France
Publ: HS-802 501, "International Technical Conference on Experimental Safety Vehicles (6th) Report", Washington, 1976 p20-41
1976; 39refs
Presented at the Conference held in Washington, 12-15 OCt 1976.
Availability: In HS-802 501

HS-021 651

U.S. STATUS REPORT ON ESV [EXPERIMENTAL SAFETY VEHICLE] PROGRAMS

U.S. work on the Research Safety Vehicle (RSV) Prog., international cooperation via the Experimental Safety Vehicle (ESV) Prog., related supportive research, and future plans are reviewed. Phase 1 of the RSV program, which has been completed, involved definition of the problems, development of 1985 projections and cost/benefit methodologies, evaluation of countermeasures, and proposal of specifications for the integrated test vehicles now being developed in Phase 2. Two companies, Calspan and Minicars, are each developing such a vehicle which should be cost beneficial in the 1985 time period. Phase 3 will include final vehicle design, systems development testing, and fabrication of the integrated test vehicles. Phase 4 will include independent testing and evaluation by the government. The ESV Program has fostered a spirit of cooperation which has extended to the exchange of ESV's. Work in biomechanics has been concerned with maximum upper belt force as a measure of human tolerance in a belt system, head acceleration measurements to predict closed head injury in crashes, and a crash victim simulator computer model. The National Accident Sampling System has been planned for fiscal year 1977. Information has been exchanged on cost/benefit analysis and uniform testing techniques. Work in pedestrian safety has included development of a repeatable test for evaluating concepts; work in accident avoidance has included gathering of data together for analysis. Other research has included development of an economical recorder, electromagnetic interference/compatibility research, investigation of frontal crashworthiness of subcompact vehicles, gathering of data on aggressiveness of vehicles, and development of scale model crash testing techniques.

by John W. Snow
National Hwy. Traffic Safety Administration
Publ: HS-021 501, "International Technical Conference on Experimental Safety Vehicles (6th) Report," Washington, 1976 p66-71
1976
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HS-021 652

VEHICLE SAFETY RESEARCH IN CANADA

Canadian research in automotive design and safety has centered on evaluation, in a Canadian context, of vehicular modifications originated elsewhere, in particular for collision avoidance and crashworthiness of the passenger automobile. Projects have included the following: relationship of headlamps to nighttime vision, including mathematical modeling of objects on the roadway; cost-effectiveness studies of improvements to defogging and defrosting systems; selection of standards for motor vehicle inspections; cost-effectiveness studies of various occupant protection systems; and a study of injuries of restrained occupants in order to deduce what improvements should be made in the overall occupant protection system. Future research will include the adaptive behavior of the driver to particular accident countermeasures.

by Eric R. Welbourne
Department of Transport, Canada
Publ: HS-802 501, "International Technical Conference on Experimental Safety Vehicles (6th) Report," Washington, 1976 p71-5
1976
Presented at the Conference held in Washington, 12-15 Oct 1976.
Availability: In HS-802 501

HS-021 653

FIAT TECHNICAL PRESENTATION

Systematic, centered, frontal collisions were run in a longitudinal direction, between vehicles of different models, in order to acquire a base of information on vehicle compatibilities. Some tests were run without dummies to study structural behavior; others were run with dummies to measure tridirectional deceleration of head and chest, as well as load and femurs. The cars had a mass ratio of up to 2.3. Stepwise regression analysis was made to determine conditioning parameters. A test tool was developed which consists of a moving, deformable, dynamometric barrier. Three evaluation methodologies have been developed which allow progressively more accurate analysis of vehicle compatibility, with remarkable savings in the number and cost of the cars that would be required if test collisions were run directly between the different models. The first is direct, the second is partly experimental and partly analytical, and the third is similar to the second but involves use of sophisticated mathematical models. After completing the study of frontal collisions, research will be extended to side and pedestrian collisions in which the concept of compatibility is fundamental.

by Enzo Franchini
Fiat Motor Co., Safety Center, Italy
Publ: HS-802 501, "International Technical Conference on Experimental Safety Vehicles (6th) Report," Washington, 1976 p129-57
1976; 6refs
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Availability: In HS-802 501

HS-021 654

AERODYNAMIC RESEARCH FOR THE EVALUATION OF THE SIDE WIND GUST EFFECTS ON THE DIRECTIONAL CAPABILITY OF A VEHICLE, BY WIND TUNNEL TESTS

Five vehicles varying in tail design were tested in a wind tunnel at yawing angles of from zero to 40° each, to compare aerodynamic coefficients. The five designs included the basic threebox type, semifastback, fastback, semistationwagon, and

station wagon. Of these the fastback was the least sensitive to yawing, but this parameter is probably insufficient to evaluate either the different sensitivities of the vehicles to side winds, or their different road behaviors. Calculation was made of the trajectories covered by the five vehicles, in steady state conditions, as a result of crosswind gust; this allowed calculation of the bending radius of the trajectories covered by the five vehicles. Among the five vehicles tested, the fastback is the best one in crosswind conditions since it covers a trajectory with the highest bending radius. A further comparison made using parameters of another study confirmed the results. The study shows that the yawing movement coefficient is the most indicative of the sidewind sensitivity of a vehicle, that a simple comparison can be made using the sidewind design coefficient, and that a more sophisticated comparison can be made by taking into account the vehicles' aerodynamic characteristics, their center of gravity, and their neutral steer points by calculating the bending radius of the trajectories covered by the vehicles in steadystate conditions or their sidewind sensitivity coefficient. One must exclude simple comparisons among different vehicles such as side areas or side center positions. One must also resist the temptation to indicate which one of the tails is the best to deal with sidewind sensitivity; the aerodynamic coefficients depend on the wake pattern and specifically on the location on the vehicle's rear surface where the airstream detaches from the body. The airstream separation point can easily be changed by detailed modifications.

by A. Cogotti
Pininfarina Wind Tunnel, Turin, Italy
Publ: HS-802 501, "International Technical Conference on Experimental Safety Vehicles (6th) Report," Washington, 1976 p157-72
1976; 18refs
Supported by the Italian Ministry of Transport. Presented at the Conference held in Washington, 12-15 Oct 1976.
Availability: In HS-802 501

HS-021 655

THE CONTRIBUTION OF VOLKSWAGEN TO THE RESEARCH SAFETY VEHICLE PROGRAM

Cost/benefit analyses were derived from analytical studies of automobile use and accidents and from technical considerations concerning accident avoidance and crashworthiness. The absolute benefit of safety measures was not taken into consideration. Rather, a search was made for combinations of safety measures that would yield maximum benefit at a given cost. Sensitivity analyses were used to demonstrate that combinations of this nature are hardly affected even by a grave lack of precision in the input data. Consistent measures were derived for the improvement of crashworthiness; these are tabulated. The effect of frontal, lateral, and rear impacts at various test speeds on weights and cost, and the compatibility problems raised by vehicles of differing type and mass were considered. Technical considerations can go far towards creating a rational basis for decisions on which a set of test specifications is to be used. Similar considerations may be applied to accident avoidance measures. The methodology can be used in the Research Safety Vehicle Proj.

by Wolfgang Lincke
Volkswagenwerk AG, Res. and Devel., Germany
Publ: HS-802 501, "International Technical Conference on Experimental Safety Vehicles (6th) Report," Washington, 1976 p181-92
1976; 4refs
Presented at the Conference held in Washington, 12-15 Oct 1976.
Availability: In HS-802 501

HS-021 656

CALSPAN/CHRYSLER RESEARCH SAFETY VEHICLE FRONT IMPACT STRUCTURE DEVELOPMENT

The front impact structural concept of the Calspan/Chrysler Research Safety Vehicle (RSV) is described, and the complete vehicle static crush and computer impact simulation work is detailed. The front end structure provides protection for pedestrians in impacts up to 20 mph and protection against barrier impact up to 8 mph; the zone is the front ten inches of the vehicle. Zone 2 provides compatibility with the side and rear of struck vehicles, controlling impact force levels; primary emphasis is on front-to-side compatibility. Zone 3, the front end structure immediately forward of the dash or passenger compartment, provides the bulk of the energy-absorbing capability and prevents excessive passenger compartment intrusion while limiting g forces to a level compatible with the restraint system. A front barrier impact goal of 50 mph is considered the maximum possible within the 3000 pound total vehicle weight objective. The base car selected was the Simca 1307. Static crush tests were performed; static force-deflection properties are graphed. Dynamic flat-barrier tests were conducted at 35 mph to determine the base vehicle's ability to meet RSV specifications of occupant egress and injury criteria at all seating positions, and to obtain necessary data for correlating the computer math model to the base car barrier impact. The computer program MINIBASH was used to construct a front impact model, by which any or all of the front structural components can be arbitrarily changed to determine what effects such changes would have on the vehicle's dynamic response. The Chrysler computer program SECRIP was used to size the front end structure. Vehicle modifications were made in two stages. Front static tests for each stage are reported. Modifications included the following: all new front rails of HSLA steel, about three inches longer; engine and suspension moved forward as a unit; length added to the wheelbase forward of the dash; soft front end attached to front yoke panel; upper load path beam tooled to provide for flexibility in structural definition; floor pan center tunnel reinforcement welded directly to the HSLA floor pan; clearance between steering rack and lower suspension crossmember; extension of sills to the chain clearance line; and reduction in gage and material for the front of front rail closure panel. The assembly process of the 1307 is disturbed only by the additional parts and increased welding required.

by Frank J. Glasgow; Thomas L. Treece
Chrysler Corp., Advance Engineering Staff
Publ: HS-802 501, "International Technical Conference on Experimental Safety Vehicles (6th) Report," Washington, 1976 p401-25
1976; 5refs
Presented at the Conference held in Washington, 12-15 Oct 1976.
Availability: In HS-802 501

HS-021 657

FROM EXPERIMENTAL TO PRODUCTION SAFETY VEHICLES

Data are presented for perpendicular barrier front impact and angled and offset barrier front impact testing of the new Volvo production vehicle of the 2400 series to show that the vehicle is very close to the long-term goals of the Research Safety Vehicle in terms of both safety and producibility. Impact velocities were 30 and 40 mph and front seat dummies were restrained by air bags or three-point seat belts. In the 30 mph perpendicular impact tests, occupant compartment deformations were negligible and injury criteria were held well below anticipated limits of human tolerance. In the 40 mph tests, occupant compartment deformations were small and were located mainly in the footwell and firewall areas. Dummies restrained with the three-point belt system had chest severity indices well below the 1000 level, but the head injury criteria exceeded this limit. Dummies restrained by air bags had occupant protection criteria well below the tolerance limits; for the driver dummy, the chest injury criteria were borderline and for its head, the limit was somewhat exceeded. For the angled and offset barrier impacts, using a 30° angled barrier and a speed of 30 mph, the occupant compartment deformation was clearly negligible. Angle of rotation and lateral vehicle movement were very small during the essential part of the impact; it was considered to be on a 10 g average level. Dummy occupant injury criteria with both airbag and three-point belt restraints were far below the 1000 limit. In another offset impact test using a half barrier and a speed of 30 mph, vehicle rotation developed very gradually and was 8° at the end of the crash. Deformation of the occupant compartment did not affect occupant protection.

by A. Aasberg; L. S. Larsen; S. Runberger
AB Volvo, Sweden
Publ: HS-802 501, "International Technical Conference on Experimental Safety Vehicles (6th) Report," Washington, 1976 p474-83
1976; 9refs
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Availability: In HS-802 501

HS-021 658

THE NATIONAL CRASH SEVERITY STUDY

The National Crash Severity Study (NCSS) bridges the Restraint Systems Evaluation Proj. and the National Accident Sampling System by providing a nationally representative data base to determine statistical relationships between crash conditions and injury severity and to estimate the distribution of crash conditions among the nation's automobile towaway accidents. Of special interest is the estimation of the distribution of delta D (velocity change during impact) and the extent to which it can be used to predict injury severity. NCSS will describe, for each injury with an Abbreviated Injury Scale (AIS) of 2 or higher, the details of the specific injury, the contact point causing it, the medical treatment required, and the days of disability and workdays lost. The NCSS data are to be collected in a purposive sample of eight areas having almost the same distribution of central city, suburban, small-town, and rural population as the nation; there is at least one NCSS area in each of the nation's four demographic regions. Accidents are chosen for inclusion in the data base by strict adherence to a stratified probability sampling scheme. The sample will eventually contain 25,000 occupants including approximately 600 fatalities and 1500 severe (AIS of 3, 4, or 5) injuries, and will be representative of about 100,000 occupants of automobiles towed from accidents in the eight areas. Seven multidisciplinary accident investigation teams will collect the data; a quality control contractor will be responsible for consistent interpretation of data elements.

by Charles J. Kahane; Russell A. Smith; K. J. Tharpe
National Hwy. Traffic Safety Administration; University of Houston, Houston, Tex.
Publ: HS-802 501, "International Technical Conference on Experimental Safety Vehicles (6th) Report," Washington, 1976 p493-516
1976
Presented at the Conference held in Washington, 12-15 Oct 1976.
Availability: In HS-802 501

HS-021 659

DESCRIPTION OF LATERAL IMPACTS

A representative sample of 296 severe lateral impacts that have caused occupant injuries is analyzed in terms of the distribution of impact points and angles, the distribution of carspeed variation (delta V), and the frequency and degree of wall deformations; the effects of these factors on the type and severity of lesions are then analyzed. Typical cases of side impacts presented in detail include the following: a Renault 16 and Peugeot 104; a BMW 3.0 against BMW 1602; a Renault 15 against Citroen DS; a Peugeot 504 against a street lamp; and an Opel Kadett against a tree. Simulation of a very representative car to car side impact would be one in which the front center of the striking car impacts the side of the other car at a point located 10 cm forward of the projection of the Hx-point on the door, and in which the apparent trajectory of the impacted occupant would make a 70° angle with the longitudinal axis of the car. The relative velocity with which the nearside occupant hits the intruded side is higher than the delta V of his own car; the difference is greater as the initial distance between the occupant and the wall is shorter. Out of 100 fatal or severe injuries sustained by nearside occupants with intrusion, 50 have occurred in cars whose delta V was never over 29 km/h, since impacting and impacted cars are sometimes designed so incompatibly that the impacted car may sustain a substantial intrusion before the rigid members of its structure are acted upon by forces. Biomechanical tests indicate that occupant coupling with the wall (assuming a certain intrusion distance) and absorption by padding might substantially reduce the risk of death or severe injury below the delta V of 29 km/h. The exposure of various body areas was determined by integrating the frequency and severity of lesions sustained by cubing the abbreviated injury scale (AIS) of each main body area. Results are 0.35 for the head, 0.25 for the thorax and abdomen, and only 0.9 for the pelvis and 0.05 for the neck. Out of 31 lesions with an AIS of 5, 21 involved the head by con-

tact against A pillars or B pillars, roof frames, or obstacles with occasional interposition of side glass.

by F. Hartemann; C. Thomas; J. Y. Foret Bruno; C. Henry; A. Fayon; C. Tarriere; C. Got; A. Patel
l'Association Peugeot-Renault, Laboratoire de Physiologie et de Biomecanique, France; l'Hopital Raymond Poincare, Institut de Recherches Orthopediques, France
Publ: HS-802 501, "International Technical Conference on Experimental Safety Vehicles (6th) Report," Washington, 1976 p541-63
1976; 9refs
Presented at the Conference held in Washington, 12-15 Oct 1976.
Availability: In HS-802 501

HS-021 660

RESPECTIVE EFFECTS OF DELTA V, MEAN GAMMA, AND INTRUSION ON THE SEVERITY OF INJURIES SUFFERED BY OCCUPANTS NOT WEARING SEATBELTS IN FRONTAL IMPACT

Respective effects of delta V, mean gamma, and intrusion on the severity of vehicle occupant injuries are estimated by orthogonalization of the accident data. Severity of accidents is proved to be a function of delta V and the law of deceleration with respect to the characteristics of the impact, rather than a function of the variable expressing the importance of the reduction in pseudo survival space. The sample used was composed of cars which have undergone frontal impact and for which the delta V and the mean gamma could be evaluated. The value of delta V selected as the threshold of inclusion in the sample was 35 km/h; 133 cars were included. A summary interpretation of the data is shown to be related to true statistical mystification. The decrease in deceleration space is one of the factors that contributes to limiting the effectiveness of the seat belt in many models currently in circulation, since their passenger compartment is destroyed before the limit of the violence of impact that an occupant can tolerate without injury is reached.

by F. Hartemann; C. Henry; C. Tarriere
l'Association Peugeot-Renault, Laboratoire de Physiologie et de Biomecanique, France
Publ: HS-802 501, "International Technical Conference on Experimental Safety Vehicles (6th) Report," Washington, 1976 p574-9
1976
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Availability: In HS-802 501

HS-021 661

A STUDY OF SEATBELT EFFECTIVENESS BASED ON A METHODOLOGY FOR ANALYZING GENERAL CATEGORICAL DATA WITH MISCLASSIFICATION ERRORS

A methodology is developed for analyzing general categorical data with misclassification errors, and the procedure is applied to the question of seatbelt effectiveness using police-reported North Carolina accidents for the first eight months of 1975 as the original sample. The technique is based on an original large sample of such police-reported accidents together with a relatively small supplementary sample that is cross-classified by the police and by a more reliable classification mechanism. True classification of the supplementary sample is assumed to be obtained through hospital reports for injured occupants and through telephone interviews for the noninjured. Tabulated data include police and nonpolice cross-classification of injury and belt use, controlling for car type (U.S. or foreign); estimated risks and effectiveness based on police-reported data only; and estimated risks and effectiveness based on the two-sample methodology. Few conclusive statements can be made about effectiveness of safety belts, due largely to standard deviations of the estimates which in turn are partially due to the much too small size of the supplementary sample. The first sample was 81,617; the supplementary sample was 2372 and should have been three or four times larger. The small size also prevented data analysis by more than one variable at a time. The technique, however, is valid although it could be improved by incorporation of smoothing models for entries in the supplementary sample and by provision for using model-predicted estimates of the frequencies in that sample prior to merging it, statistically, with the original sample.

by Yosef Hochberg
University of North Carolina, Hwy. Safety Res. Center; Tel Aviv Univ., Dept. of Statistics, Israel
Contract DOT-HS-4-00897
Publ: HS-802 501, "International Technical Conference on Experimental Safety Vehicles (6th) Report," Washington, 1976 p593-9
1976; 11refs
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Availability: In HS-802 501

HS-021 662

SIDE IMPACT RESPONSE AND INJURY

A series of comparative side impact tests was made using unembalmed human cadavers, a Part 572 test device, and a side impact test device recently developed by the Transport and Rd. Res. Lab. (TRRL). The cadavers were equipped with head, thorax, and pelvis accelerometer instrumentation, the Part 572 device with head, thorax, and pelvis triaxial accelerometer instrumentation, and the TRRL device with head, thorax, and pelvis triaxial accelerometers as well as shoulder, rib, and pelvis load cells. The baseline test configuration was a flat, rigid wall for initial tests and a contoured, padded surface to simulate a vehicle side interior configuration for subsequent tests. All tests were performed at the Hwy. Safety Res. Inst. (HSRI) Test Facility. Results were analyzed in terms of test subject kinematics, impact responses of head, thorax, and pelvis, TRRL dummy load cell response, and cadaver injury ratings. The significant differences which exist in the side impact behaviors of the three types of test subjects are due in part to the lack of lateral compliance of the shoulder structure in dummies. The peak responses of the thorax accelerometers were similar in the three types of test subjects, but the resulting injuries in the limited cadaver test sample did not correlate well with suggested tolerance levels for lateral acceleration. The peak responses of the pelvis accelerometers were similar for the three types of test subjects. The differences between dummy and cadaver in lateral compliance of the shoulder and arm structures and in the distribution of masses in the lower

body must be considered in the design of energy-absorbing side impact structures.

by J. W. Melvin; D. H. Robbins; R. L. Stalnaker
University of Michigan, Hwy. Safety Res. Inst.
Contract DOT-HS-4-00921
Publ: HS-802 501, "International Technical Conference on Experimental Safety Vehicles (6th) Report," Washington, 1976 p681-9
1976; 2refs
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Availability: In HS-802 501

HS-021 663

DESIGN OF THE 4-215 D.A. AUTOMOTIVE STIRLING ENGINE

The designing is described of a four-cylinder double-acting 170-hp Stirling engine with a swash-plate drive, suitable for passenger-car installation. Performance and steady-state fuel economy measured on a dynamometer are also presented. Details are given of the heater head assembly (a flexible cage was designed), the cooler-regenerator unit, air preheater, the conical burner, the exhaust gas recirculation, mechanical drive system, sealing system, and the control systems. Results in terms of fuel economy, driveability, emissions, performance, noise, packageability, start-up time, and engine weight are presented, in comparison with objectives. The engine shows potential for achieving low noxious emissions at zero miles, excellent fuel economy, performance similar to that of the untreated base-line engine, low noise level, and capability for operating on a variety of liquid or gaseous fuels.

by R. van Giessel; F. Reinink
N. V. Philips' Gloeilampenfabrieken, Germany
Rept. No. SAE-770082; 1977; 16p 5refs
Presented at International Automotive Engineering Congress and Exposition, Detroit, 28 Feb-4 Mar 1977.
Availability: SAE

HS-021 664

THE SHUTTLE DISTRIBUTOR FOR A DIESEL FUEL INJECTION PUMP

A small, high pressure shuttle valve to distribute Diesel injection fuel from one pumping element to two nozzles has been developed. In this scheme three pumping plungers and barrels combined with three shuttle assemblies provide the high pressure fuel for a six-cylinder engine; four plungers and four shuttles serve eight cylinders, and so forth. The shuttle valves are moved hydraulically using the low pressure fuel supplied by the transfer pump. The pump based on this design is both smaller and less expensive than an equivalent conventional pump because there are half as many pumping elements as engine cylinders. Significant performance advantages have also been shown due to the action of the shuttle valves; since it is possible to operate this in-line pump at engine speed, higher injection pressures, shorter injections, and a variety of injection pressure pulse shapes are practical. The hydraulic governor, a schematic of which is presented, operates on Diesel fuel as all-speed or min-max, has flexible torque control over the entire speed range, and many other features.

by J. R. Voss; R. E. Vanderpoel
AMBAC Industries, Inc., American Bosch Div.
Rept. No. SAE-770083; 1977; 8p
Presented at International Automotive Engineering Congress and Exposition, Detroit, 28 Feb-4 Mar 1977.
Availability: SAE

HS-021 665

PRELIMINARY ECONOMIC EVALUATION OF THE USE OF GRAPHITE COMPOSITE MATERIALS IN SURFACE TRANSPORTATION. PHASE 1. RESULTS

Important potential uses of graphite composites in surface transportation (motor vehicles on roads or on rails) were identified, preliminary estimates of the degree of substitution of graphite composites for metals were made, and rough order of magnitude estimates were made of the use of graphite composite materials. Vehicles studied included passenger automobiles, trucks, freight and passenger trains, buses, subway cars, and streetcars. Economic incentives for the use of composites were studied, as was the national economic impact of such use. Use of graphite composites as a means of reducing vehicle weight will probably not occur until after 1985, since current weight reduction schemes are based on downsizing and use of aluminum, plastics, and composites for iron and steel. Extensive use of composites will not be achieved before 1990. Factors that inhibit earlier use of composites include lack of a design data base, insufficient technical personnel trained in application of composites, capital plant investment, and production lead times. Consumption of graphite composites could reach approximately 860,000,000 pounds per year by 1990, implying a significant yearly increase from the present of about 250,000 pounds per year. Use of plastics and graphite composites would also cause a growth in the plastics industry. There is a potential market for graphite composites in trucks and railroad freight cars; the truck industry is a technological derivative of the passenger car industry and should eventually provide a large market for graphite composites. Appended are a description of the physical properties of advanced composites and an estimation of composites use in post-1985 automobiles.

Econ Inc., 900 State Rd., Princeton, N.J. 08540
Contract NASW-2781
Rept. No. Econ-77-165-1; 1977; 149p 7refs
Availability: Reference copy only

HS-021 666

COMPUTERIZED SIDE IMPACT INJURY ANALYSIS

Analysis was made of221 car-to-car side impact collisions, selected from the MultiDisciplinary Accident Investigation files, using the Calspan Reconstruction of Accident Speeds on the Highway (CRASH) computer model. Injuries of nonejected occupants are related to crash severity. Head and chest injuries were the most predominant in the sample. The two factors which are sufficient to predict chest injury in side impacts are the contact point within the car and the velocity change vector (delta V) of the occupant. The subset of data for chest injuries resulting from contact with the side door panel is studied in detail. Nearside occupants have higher injury potential than farside occupants during side impact crashes:

the injury potential of the farside occupant at a given delta V is equivalent to that of a nearside occupant at about half that delta V. Age, or perhaps a combination of physical condition and age, has a major effect on injury potential for crash severities that occur within a transition range of velocity change of between 15 and 30 mph; this translates to a change of velocity of 25-40 mph for the occupant when the increased velocity of the intruding door structure is taken into account. Some variability in occupant injury is to be expected due to the range of structural characteristics of the vehicles. Improvements in injury potential can be achieved by making the vehicle side structures stiffer and/or front structures softer.

by M. Monk; A. Burgett; L. DeLarm
National Hwy. Traffic Safety Administration, Washington, D.C. 20590
Publ: HS-021 782, Stapp Car Crash Conference (21st) Proceedings, Warrendale, Pa., 1977 p1057-89
Rept. No. SAE-770940; 1977; 10refs
Presented at 21st Stapp Car Crash Conference, New Orleans, 19-21 Oct 1977.
Availability: SAE

HS-021 667

TRAUMATIC AND COST MAINPOINTS OF INJURY MODEL AND CAUSE OF INJURY CONCERNING UNRESTRAINT AND RESTRAINT CHILD CAR OCCUPANTS AND AGGRESSIVITY AND COST OF INJURIES BY VEHICLE FRONT SHAPES AND ELEMENTS IN REAL PEDESTRIAN ACCIDENTS

Compared with other groups of traffic participants, the relative danger for child passenger car-occupants, as well as for pedestrians, is increasing. Based on 130 medically and technically studied single-case analyses of real accidents involving child car-occupants, the importance of major influences on trauma, such as impact direction, seating position, and age, has been investigated. The most dangerous occupant position is the front passenger, and the least dangerous is the middle back seat. Improvements in side impacts are as desirable as those in frontal impacts. For unrestrained children, points of contact include the windscreen, side window, and roof frame; for restrained children, points of contact are the windscreen, side furniture, and the restraint system itself. The dysfunction of the restraint system which causes the most injury is incorrect position of anchor points. As to pedestrian accidents, an optimization of the vehicle exterior is only reasonable. In 310 single-case analyses of real pedestrian accidents involving 170 children, the aggressivity of the vehicle, measured by the costs arising from injuries received, is analyzed for vehicle frontal impacts with regard to different front shapes and their elements.

by G. Sturtz
Technical Univ., Inst. of Automotive Engineering, Berlin, Germany
Publ: HS-021 782, Stapp Car Crash Conference (21st) Proceedings, Warrendale, Pa., 1977 p1093-122
Rept. No. SAE-770941; 1977?; 31p
Presented at 21st Stapp Car Crash Conference, New Orleans, 19-21 Oct 1977.
Availability: SAE

HS-021 669

BASIC STUDIES OF AUTOMOBILE TIRE NOISE

A facility for the study of automobile tire noise is investigating the description of a tire sound field by the superposition of the sound fields of individual tread features. The specially quieted roadway simulation apparatus uses a 67" diameter cast aluminum roadwheel with a 3-M safety walk (medium grade) working surface. Instrumentation includes B and K microphones, preamplifiers, heterodyne spectrum analyzer, level recorder, H-P digital ensemble averager and other electronics; a microphone positioning unit for sound field surveys; and an electrical pulse for triggering the ensemble averager at a given point in the tire rotation. Special test tires included blank tires, straight groove, and wavy groove tires. The "acoustic signatures" of individual tread features were superimposed on the "baseline spectra" given by the blank tire; it was found possible to use superposition to estimate the sound field generated by a complex tread pattern from that generated by simple tread elements. The data suggest that for a quiet tread pattern, the groove cross section should be the same everywhere around the tire. The superposition work will continue; a direct comparison will also be made of the laboratory data with a field experiment. The spectra presented are quite consistent with the road-test, third-octave, spectra obtained at General Motors Proving Ground, when allowance for the fixed bandwidth form is made.

by Joseph Pope; William C. Reynolds
Stanford Univ., Dept. of Mechanical Engineering, Stanford, Calif.
1975; 11p 10refs
Presented at 3rd Interagency Symposium on Univ. Res. in Transportation Noise, 14 Nov 1975. Sponsored by the National Science Foundation, Engineering Div.
Availability: Reference copy only

HS-021 670

INVESTIGATION OF THE NOISE AND VIBRATION CHARACTERISTICS OF RADIAL AND BIAS PLY TRUCK TIRES

A comparison was made of the noise and vibration produced by radial tires and bias ply tires on large trucks. One bias ply and four radial truck tires were tested; of the radials, size 10:00-20, two were of the cross-bar type and two of the rib type. A data acquisition system capable of simultaneous recording of four data signals was assembled, handling two telemetered vibration signals and two additional signals, sound and a synchronizing signal. Phase distortion in the acquisition system was acceptable for the experiments planned. The FM recorder was interfaced to a mini computer. Software was written to perform the desired digital analyses. Preliminary results showed: that the sidewall acceleration levels are 10 dB lower than the tread acceleration levels for both radial and bias ply tires; new moderately loaded radial rib and cross bar tires generate very nearly the same sound levels; the wave propagation directions appear to be strongly related to tire cord orientation; and coherence analysis of tire sound and

sidewall vibration shows a high coherence at many frequencies in the sound and vibration signal.

by W. F. Reiter, Jr.; A. C. Eberhardt
North Carolina State Univ., Center for Acoustical Studies, Raleigh, N.C. 27607
Grant DOT-OS-20105
1975; 12p 2refs
Presented at 3rd Interagency Symposium on Univ. Res. in Transportation Noise, 14 Nov 1975.
Availability: Reference copy only

HS-021 671

THE RISK OF WALKING

Analysis of United Kingdom National Travel Survey data on the amount of walking done by 17,000 individuals has shown that people spend about twenty minutes per day travelling by foot, on average. Average distance walked is 0.82 miles, average speed 2.4 mph. This implies a pedestrian accident rate of about 500 accidents per hundred million miles walked, a greater rate than for car drivers but less than for motorcyclists. Accident risk is related to age and sex of pedestrian, time of day, day of week, and month of year. For daylight hours, the average number of pedestrian accidents is approximately proportional to the product of vehicle and pedestrian flows. The accident rate is higher for boys than girls and is higher for men than women, except for the very elderly. Children are more prone to accidents than adults in the prime of life. Fridays and Saturdays are more dangerous than other days, and winter is more dangerous than summer.

by P. B. Goodwin; T. P. Hutchinson
Publ: Transportation v6 n3 p217-30 1977
1977; 23refs
Availability: See publication

HS-021 672

METHODS AND LIMITS OF COMPUTER-AIDED CRASH SIMULATION (METHODEN UND GRENZEN DER RECHNERGESTUTZTEN CRASH-SIMULATION)

Crash simulation may be performed by either analytic procedures which require material data only and hybrid procedures which require additional component test data. Hybrid simulation procedures include the simulation model of a frontal barrier impact of Kamal (SAE-700414), and the one-dimensional models of Tani and Emori (SAE-700175) and of Miura and Kawamura (SAE-680484). Pure analytic simulation models include quasistatic calculation, the plastic hinge method, and use of element models such as the UMVCS code, the FEM model, and the crash program of Ni. Graphic data of the various simulation procedures are presented.

by K. Hieronimus; D. Schaper
General Motors Corp., Environmental Activities Staff, General Motors Technical Center, Warren, Mich. 48090
Rept. No. USG-1596; 1977?; 29p 11refs
English translation of the accompanying original German.
Availability: Corporate author

HS-021 673

RESEARCH AND DEVELOPMENT PROGRAMS BY R AND D MANAGEMENT OBJECTIVES. FISCAL YEAR 1976 PROGRAM ANALYSIS. PROGRAM LEVELS FOR FISCAL YEARS 1974, 1975, AND 1976

Tabular summaries are presented of the research and development programs of the following: Office of the Secretary of Transportation, U.S. Coast Guard, Federal Aviation Administration, Federal Hwy. Administration, Federal Railroad Administration, National Hwy. Traffic Safety Administration, and the Urban Mass Transportation Administration. Each lowest level budget line item is a program which is indexed so it can be located under the section of the report dealing with management objectives. Management objectives by which all programs are classified and summarized include modernization of regulations and legislation, increase in efficiency and service, improvements in safety and security, lessening of unfavorable environmental impacts, minimization of adverse impacts on energy constraints, and increase in data or knowledge base. The third section of the report contains graphs showing program level and percentages distribution by department of funding by transportation mode, transportation subsystem, type of cargo, reason for Federal involvement, and phase of the research and development.

Department of Transportation, Office of Res. and Devel. Plans and Resources
Rept. No. DOT-TST-75-107; PB-243 700; 1975; 204p
Availability: NTIS

HS-021 674

TRANSPORTATION ENERGY CONSERVATION DATA BOOK: EDITION 2

Secondary data on transportation characteristics by mode, transportation energy use, and other related variables are presented in tabular and/or graphic form. Highway, air, rail, marine, and pipeline modes are represented. Included in the more than 400 tables and figures are the following transportation stock and use statistics: number of vehicles, vehicle miles traveled, passenger-miles and freight ton-miles, fleet characteristics, household automobile ownership, size mix of automobiles, vehicle travel characteristics, and commuting patterns. Energy characteristics presented include energy use by fuel source and transportation mode, energy intensity figures by mode, indirect energy use, production as a percent of consumption, imports as a percent of domestic production, energy prices from the wellhead to the retail outlet, and alternative fuels. Information is also presented on the National Energy Plan, the Dept. of Energy, the Environmental Res. and Devel. Administration's electric and hybrid vehicle project, and the transportation and energy demand projections of the Transportation Energy Conservation Div.

by D. B. Shonka; A. S. Loebl; P. D. Patterson
Oak Ridge National Lab., Regional and Urban Studies Section, Oak Ridge, Tenn. 37830
Contract W-7405-eng-26
Rept. No. ORNL-5320; 1977; 521p refs
Availability: NTIS $13.75, microfiche $3.00

HS-021 675

EFFECTIVENESS OF LICENSE SUSPENSION OR REVOCATION FOR DRIVERS CONVICTED OF

MULTIPLE DRIVING-UNDER-THE-INFLUENCE OFFENSES. INTERIM REPORT

Evaluation is made of a California demonstration project in which drivers having multiple convictions of driving under the influence (DUI) were given the opportunity to participate in a 12-month alcoholism/alcohol abuse rehabilitation program instead of receiving the mandated license suspension or revocation. Drivers convicted of multiple DUI offenses who received a mandated license suspension/revocation evidenced a significantly better six-year subsequent driving record than that of a comparable group of drivers not receiving the mandated licensing action. Specifically, the drivers convicted of multiple DUI offenses had fewer reckless driving convictions, minor one-count traffic convictions, total countable traffic convictions, total crashes and personal injury and fatal crashes during the six-year follow-up period. The treatment effect associated with the suspension or revocation of the driving privilege of multiple DUI drivers diminished at 42 months for subsequent DUI occurrence and 48 months for subsequent crash involvement. It would appear the changes in driving practices created by the suspension/revocation treatment effect extended beyond the actual time period the license control was imposed. The traffic safety impact of the treatment effect associated with license suspension/revocation was not consistent for three driver age groups: 30 and under, 31-50, over 50. The effect similarly impacted the incidence of both major and minor traffic convictions for all three age groups but only impacted crashes for drivers over the age of 30. Minimal treatment effect differences were found in the occurrence of DUI's and crashes for each group of drivers under the age of 30, when compared over the six-year followup period. It appeared the duration of the treatment effect on subsequent DUI and crash involvement, of 42 and 48 months, respectively, existed principally for drivers over the age of 30. This suggested the rate at which the suspension or revocation treatment effect diminished over time may differ for various age groups of drivers. The suspended or revoked middle aged driver group (31-50) evidenced a higher frequency of major two count traffic reconvictions than the other two age groups of drivers receiving similar licensing actions. This suggested that the mandated licensing action had little effect on the severity of the continued traffic violations for this age group of drivers. The oldest driver group (over 50) receiving a license suspension/revocation evidenced a lower incidence of DUI reconviction than the younger two age groups of drivers receiving similar licensing actions. Because a difference was not found in an analysis of the age groups of nonsuspended/revoked drivers, the impact was attributed to the licensing action rather than being considered simply a product of maturation.

by Roger E. Hagen
California Dept. of Motor Vehicles, Res. and Devel. Section
Grant OTS-057701
Rept. No. CDMV-59; 1977; 62p 14refs
Interim report of "An Evaluation of the Effects of Not Suspending the Driving Privilege of SB-330 Program Participants."
Availability: Corporate author

HS-021 676

CLOSED LOOP CONTROL OF INTERNAL COMBUSTION ENGINE EFFICIENCY AND EXHAUST EMISSIONS. FINAL REPORT

The benefits of closed-loop spark advance control based on cylinder pressure information were studied; inexpensive and reliable pressure transducers were analyzed; and the air/fuel ratio control was extended to the lean operation condition where the zirconia oxygen sensor must be temperature compensated. The spark advance controller developed during the previous year was carefully evaluated and extended to provide a retard based on detonation as determined from a pressure sensor. Piezoelectric and piezomagnetic transducers were found to have the highest potential of meeting sensor requirements imposed by the engine environment and mass producibility at a reasonable cost. A lean air-fuel ratio controller based on a temperature compensated zirconia sensor was built, evaluated, and shown to reduce temperature sensitivity by a factor of four at an equivalence ratio of 0.8. Appendices present an analysis of piezoelectric and piezomagnetic sensors, descriptions of the experimental apparatus and electronic hardware, the computer programs, and the microprocessor system components.

by Kent W. Randall; David Powell
Stanford Univ., Dept. of Mechanical Engineering, Stanford, Calif. 94305
Contract DOT-OS-30111
Rept. No. DOT-TST-76-107; 1976; 199p 42refs
Rept. for May 1975-Apr 1976.
Availability: NTIS

HS-021 677

METHODOLOGY FOR ESTIMATING THE IMPACTS OF CHANGES IN HIGHWAY PERFORMANCE

This report provides an overall framework and a specific methodology for estimating changes in highway performance from changes in both highway physical condition and use; and for estimating the impacts from changes in highway performance. The entire methodology is presented, along with a demonstration; the methods can be applied to any specific scenario on highway performance changes (or changes in physical condition and use). First, information on highway physical condition and highway use is converted into a first approximation of changes in accidents, vehicle operating costs, travel time, and pollutant emissions for each functional class of highway. Then results are converted to dollar-equivalent costs and an adjustment is added for comfort and convenience; the result is a total direct-user impact. Finally, this is modified by several adjustments that account for all indirect and subsequent-round impacts. The suggested framework and methods have been carefully designed to provide a complete accounting of all impacts without double counting. Direct measurements or effects of performance change, such as vehicle operating costs, accident costs, travel-time and comfort/convenience, are converted to dollar equivalent values and are used to estimate indirect and second, third, and subsequent round impacts. In most cases 80% or more of all direct and indirect impacts of highway performance change can be accounted for in direct-user impacts. The methodology is designed for evaluation of nationwide highway performance changes, but may be adapted for use in analyzing specific states, regions, or transportation corridors. Using the suggested minimum detail on highway types and vehicle types, an experienced user can compute total impacts

for a given scenario on performance change in approximately one manweek of time.

by Ernest J. Mosbaek; Harry S. Cohen
Jack Faucett Associates, 5454 Wisconsin Ave., Chevy Chase, Md. 20015; System Design Concepts, Inc., One Farragut Square So., Washington, D.C. 20006
Contract DOT-FH-11-9137
Rept. No. FHWA/PL/77/020; 1977; 213p 59refs
Availability: NTIS

HS-021 678

AN ANALYSIS OF ANNUAL MILEAGE SELF REPORTED BY RENEWAL APPLICANTS

Basic driving exposure data for North Carolina drivers were derived by using drivers' estimates of mileage driven as the measure of exposure and relating them to other significant variables. Self-reported estimates of annual mileage were obtained via a statewide survey of drivers in conjunction with the evaluation of new, written driver license examinations. Average reported annual mileage is broken down by age, gender, and race of driver, and analyses of variance were done on the means. Nonwhites tend to have lower annual mileages than whites across all age and both sex groups. The primary age effect seems to stem from the lower annual mileages of the oldest age group over all race and sex combinations. Married females show considerably lower annual mileages than unmarrieds; married males have higher annual mileages than unmarried males. As for the variable of education, for the older age groups annual mileage seems to increase generally with increasing education, while for the younger age groups, this trend appears to be reversed to some extent. For nearly every driver category, average vehicle-specific annual mileage is highest for later model cars. Young drivers, with the exception of nonwhite males, report more total driving exposure in the later model cars than in earlier models; it is the oldest male groups who have the highest exposures in the older model cars. Females report higher nighttime percentages across all age groups, but the data are of doubtful value because of an extremely high nonresponse rate for that question. Comparison of accident rates as a function of driving exposure shows that for all age groups except the 55 years and older group, males have roughly twice as many accidents per driver as do females. On the other hand, with the exception of the 16-19 year old group, females have overall accident rates that are nearly twice as high as males. Female drivers tend to fall mostly into the low mileage categories, while male drivers are mostly in the high mileage categories. Within mileage categories, numbers of accidents per driver and accident rates are much more comparable between males and females, although females seem to have lower accident rates. Within sex/mileage categories, accident rates tend to decrease with increasing age of driver. There is a pronounced decrease in accident rates with increasing annual mileage within age/sex categories. The mileage factor is shown to be stronger than those of age or sex. Some of the difference between male and female drivers in terms of overall accident rates may be due to a possible tendency of males to overestimate their mileage and of females to underestimate their mileage. Appended are the questionnaire used to gather the self-reported data and tabulated data of average accidents per driver and accident rates per 100,000 miles as functions of age, sex, and race, together with marital status, education, and occupation.

by J. Richard Stewart
University of North Carolina, Hwy. Safety Res. Center, Chapel Hill, N.C. 27514
1972?; 54p 3refs
Availability: Corporate author

HS-021 679

ACCIDENT REPORT COLLISION DIAGRAM VALIDITY STUDY

Validity of police report diagrams pertaining to utility pole crashes was examined in a data sample of 20 accident reports from a four-county area in central North Carolina, by comparison of the data with surveys of the accident site. Ten reports each were used from the old and the new accident reporting forms. Surveys of the accident site were made to determine the following information: setback distance of the pole from the edge of the pavement; estimated angle of impact from the centerline of the roadway; type of location; curb description; and approximate spacing of utility poles. Although some officers make an attempt to sketch the accident scene in scale, others make no attempt to scale, resulting in useless or even misleading sketches. This is particularly true for distance of utility pole setback. A supplementary form should probably be used by investigating officers at the scene of utility pole crashes, in order to gather reliable data.

by William W. Hunter
University of North Carolina, Hwy. Safety Res. Center, Chapel Hill, N.C. 27514
1973; 27p
Availability: Corporate author

HS-021 680

SCHOOL BUS SAFETY IN NORTH CAROLINA. SCHOOL BUS ACCIDENTS AND DRIVER AGE

Accident rates in N.C. for one school year were analyzed. It was found that younger drivers (age 16 through 20) had a higher accident rate than the adult drivers (age 21 and over), but the poorer record of the younger drivers was accounted for by the 16-year-old drivers. With this group removed, drivers age 17 through 20 were as good as the older ones. Because further analyses indicated that the problem of the 16-year-old driver was primarily one of inexperience, recommendations were made to license more schoolbus drivers at age 17 rather than 16 whenever possible, provided they have had a full year of motor vehicle driving experience; it was also recommended that the training of the 16-year-old drivers be extended and upgraded. The drivers age 17 through 19, the vast majority of the total number of school bus drivers in N.C., compared well with those age 25 through 54; the crashes of the 16-year-old drivers, though more frequent, were no more severe than those of older drivers. The practice of using student drivers appears justifiable in light of the findings. Federal standards, while valuable as guidelines and in providing impetus for improvement, should not be automatically accepted. The requirement that enough buses be provided so that there will be no standees is questioned, and evidence cited that it might be more beneficial from a safety standpoint to spend the money modifying the interior of the bus. In the second report are examined the rates and types of school bus

accidents according to the age of the school bus driver. Data were obtained on 10,508 drivers and an annual mileage of 74,110,890 miles. The age group mileage, number of passengers carried, and urban or rural driving exposure were related to the 1971-72 school bus drivers involved in accidents. The recommendation is to license more 17-year-old drivers; to select any 16-year-olds from among those who have used the learner's driving permit for a full year; and to expend more hours in working with 16-year-old drivers to expand and upgrade their training.

by Patricia F. Waller; Judith McMichael
University of North Carolina, Hwy. Safety Res. Center,
Chapel Hill, N.C. 27514
1976; 5p
Monograph contains two articles. First study presented to the North Carolina State Board of Education Transportation Com.
Availability: Corporate author

HS-021 681

FORECASTS OF THE 1985 ACCIDENT ENVIRONMENT: A REPORT TO VOLKSWAGEN AG IN CONNECTION WITH THE RESEARCH SAFETY VEHICLE PROJECT

Forecast data were obtained from a variety of sources, a statistical procedure was used to estimate the current national accident mix from North Carolina data, and an iterative proportional fitting model was used to forecast the 1985 effect of five predictor variables on future accident mix. Current accident assessment is made in terms of the following: accident causation by driver age, alcohol, attitude, and vehicle variables; estimates of national distribution of accident types; estimated current and predicted future weight distribution of cars in the U.S.; issues related to car size; and pedestrian and cyclist factors in injury causation. As for future vehicle requirements and usage, the economic factors of mass transit and car visibility and performance are considered, as well as such factors as population age and sex, urbanization, traffic volume on the interstate road, and changes in vehicle mix. Phase 1 of the forecast model weighted the North Carolina data so that it more nearly matched the national accident distribution. Phase 2 produced estimates of the 1985 distribution of U.S. accident types in 140 classes. Basic assumptions and data used are described. Results of the various runs are tabulated. Overall results suggest that vehicles in 1985 will be exposed to a variety of crash situations that are very similar to that seen today, with only a slight shift in the direction of more car-to-car crashes and a slight increase in rear impacts, both logical results of increased urbanization. Appended are the sources contacted for forecast data and abstracts of significant studies.

by B. J. Campbell; Lindsay I. Griffin; Donald Reinfurt; Yosef Hochberg; Beth Tingley; Lucy Smith; Gary Koch
University of North Carolina, Hwy. Safety Res. Center,
Chapel Hill, N.C. 27514
1974; 116p 81refs
Availability: Corporate author

HS-021 682

THE CONSEQUENCES OF THE ENERGY CRISIS FOR HIGHWAY SAFETY

A reduction in miles driven may result in fewer crashes and fatalities, but a decrease in the rate of accidents per million miles driven may not necessarily follow. The true reduction in fatalities will probably lie somewhere between an optimistic 29% and a conservative 3%. Accident involvements have been found to be a function of variability in speeds, i.e. vehicles traveling at 20 mph above or below the average speed of traffic are more likely to be involved in crashes than those traveling at the average speed. Habitual driving at speeds faster than the new speed limits may require intensive law enforcement with publicity to reinforce the new habit of driving at 55 mph. The benefits of the motorcycle in regard to fuel conservation must be balanced against the cost in terms of safety. There is also an inherent safety trade-off in the shift to small cars.

by Forrest M. Council; Patricia F. Waller
University of North Carolina, Hwy. Safety Res. Center,
Chapel Hill, N.C. 27514
1974; 9p 4refs
Also published in Traffic Safety v74 n4 (Apr 1974).
Availability: Corporate author

HS-021 683

DRIVER EDUCATION: CAN ITS GOALS BE REALISTICALLY MET?

In a consideration of school driver education programs, two general goals are cited. First, the program should provide basic instruction in driving techniques, knowledge of how to handle a car in special circumstances, environments, and emergencies, and a knowledge of local and state motor vehicle and traffic laws and ordinances. Second, the course should produce a more knowledgeable individual knowing enough about highway safety to demand and support higher safety standards. The first goal is realistic for a driver education course, but the second demands much more than a single course. Highway safety concepts can be incorporated into various parts of the curriculum; for example, velocity changes can be studied in physics, safety legislation in government, and driver characteristics in sociology. There should be a graduated driver license whereby the young driver is introduced more gradually into the driving population on the basis of experience and demonstrated skill. Such a license would require the coordinated efforts of driver education instructors, driver license administrators, enforcement personnel, and parents.

by Patricia F. Waller
University of North Carolina, Hwy. Safety Res. Center,
Chapel Hill, N.C. 27514
(n.d.); 5p
Also published in Perception.
Availability: Corporate author

HS-021 684

EFFECT OF RANGE TRAINING: COMPARISON OF ROAD TEST SCORES FOR DRIVER EDUCATION STUDENTS

Comparative analysis was made of two samples of road test scores to compare performance of students in North Carolina's range-related driver education program with those

in the standard "30 and 6" training. Very little difference was seen between those receiving the newer range type training and those receiving the standard 30 hours of classroom and six hours of behind-the-wheel instruction. In the cases in which significant differences did exist in both the analysis of variance and the analysis of subgroup means, a trend toward slightly higher road test scores in the standard sample was seen. This disappointing result indicates that the range curriculum needs to be improved.

by Forrest M. Council; Rita B. Roper; Michael G. Sadof; Linda P. Desper
University of North Carolina, Hwy. Safety Res. Center, Chapel Hill, N.C. 27514
1975; 29p 2refs
Financed by the North Carolina Governor's Hwy. Safety Prog., proj. 304-75-001-001.
Availability: Corporate author

HS-021 685

EMERGENCY SKILLS RESOURCES FOR RANGE-RELATED DRIVER EDUCATION

An emergency driving skills program is recommended, based on a review of the literature concerning currently existing programs and maneuvers shown to be difficult for young drivers. Review of the literature showed that advanced driver education programs generally included serpentine exercises, controlled braking, evasive maneuvers, skid recovery, off-road recovery, blowout stop, and handling of mechanical emergencies. Studies of the effectiveness of such programs have been inconclusive. The proposed program would include a serpentine maneuver, an evasive maneuver, controlled braking, off-road recovery, skid control, and mechanical emergencies; for each, a diagram is presented, along with a description of space requirements, materials, and directions for performance. The serpentine helps train proper use of hand positions, rhythm, and timing; the evasive maneuver requires a right or left cue from an instructor 60 ft before the barrier, as does the controlled braking maneuver. The off-road recovery maneuver should be used to teach both slow recovery from a stop and a quick recovery made without overshooting into the adjacent lane. The skid maneuver requires a skid pan of at least 24 x 200 ft surrounded by open pavement; if possible, front, rear, and four-wheel skids should be induced by the instructor with the dual braking system. The mechanical emergencies exercise involves shutting off the ignition so that power steering, brakes, and acceleration are lost and a successful stop must be made using the emergency brakes.

by Forrest M. Council; Michael G. Sadof; Rita B. Roper; Linda P. Desper
University of North Carolina, Hwy. Safety Res. Center, Chapel Hill, N.C. 27514
1975; 40p 55refs
Availability: Corporate author

HS-021 686

EDUCATION FOR DRIVING: AN EXERCISE IN SELF DELUSION?

North Carolina's driver licensing, driver improvement, and driver education programs are reviewed in terms of their educational value. Driver licensing systems serve as a means of identification and revenue raising; their value as devices to screen out bad drivers is debatable. Licensing, especially reexamination now being urged by the Federal government, can be educational in terms of laws and regulations. To have diagnostic and remedial functions, however, the licensing system would require costly modifications. A proposed driver licensing scheme allows the applicant credits for such characteristics as being a nondrinker or having the experience of age; certain groups such as drinkers and youth would have to take certain courses in order to demonstrate sufficient credentials for licensure. In general, driver license programs as presently administered can be seriously questioned on the grounds of validity and cost. The driver improvement program typically includes a warning or advisory notice to individuals having a given number of violations, a personal interview perhaps followed by attendance at a driver improvement school, and, if necessary, suspension or revocation of the license. The first stage is remarkably effective, the second is not particularly effective, and the third is remarkably ineffective. Perhaps accidents rather than violations should be used as the criterion for license removal. Allowance should be made for the mileage of the driver; data show that the rate of crashes per 100,000 miles is highest for the lowest mileage drivers, regardless of gender. Perhaps the driving records of commercial drivers when driving commercial vehicles and their personal vehicles should be kept separate; suspension or revocation of one would not mean suspension or revocation of the other. Poor driving is symptomatic of other difficulties the driver is experiencing; the interviewer should be trained in referral to other community resources. Driver education in the schools should be more closely related to driver licensing. Whether driver education should be funded as a highway safety activity or as an education activity is undecided. Licensing of youth should be done in stages, which could begin as early as 14 years. North Carolina is moving to elaborate rather than simplify the licensing procedure by instituting the classified license. The research community should consider the relationship between research findings and governmental programs, and should be responsible in reporting such findings. The researcher should consider such questions as the relationship of performance measures to driving record, cost/benefit ratios of licensing programs that assume diagnostic and remedial functions, the possibility of graduated licensing, the merits of the Master driver license, and the use of crashes rather than convictions as the basis for driver improvement programs. The researcher should consider the issue of special treatment for professional drivers in driver improvement programs, actual impact of incentive programs for driver improvement, coordination of driver education with driver licensing, and the relationship of such coordination to graduated licensing of youth.

by Patricia F. Waller
University of North Carolina, Hwy. Safety Res. Center, Chapel Hill, N.C. 27514
1975; 28p 18refs
Prepared for Hwy. Safety Res. Inst. Driver Res. Colloquium, Ann Arbor, Mich., 4-5 Jun 1975.
Availability: Corporate author

HS-021 687

AN ANALYSIS OF CRITICAL MANEUVERS IN THE ACCIDENTS OF YOUNG DRIVERS

Crash data of drivers age 16 through 18 years were compared with data of drivers age 35 through 44 to determine critical maneuvers, and to test the following two hypotheses: that the crashes of the younger group are more likely to involve emergency situations such as brake failures, skidding, or blowouts than are the crashes of the older and more experienced group,

and that the difficulty the younger drivers may have with certain vehicle maneuvers will be expressed in the overrepresentation of these maneuvers in their crashes. The sample was chosen from vehicle oriented crashes recorded in North Carolina in 1973; it included only private passenger cars and drivers licensed in the state, and was equally weighted between men and women and between property-damage and personal-injury crashes, within each age group. There proved to be no differences between the ability of young drivers and that of older drivers to handle emergency situations such as skids, blowouts, or brake failures. Although both groups of crashes contained the same proportion attributable to emergency situations, there are no data on the influence of emergency situations in each group. Young drivers did experience difficulty with pulling into the path of oncoming traffic and they did have a disproportionate number of rear-end collisions, probably due to inexperience in judging gap clearance and closure speeds. Appended are a sample accident report form, assumptions of the cost analysis, and cost data used in economic analysis.

by Patricia Z. Barry; Rita B. Roper; Linda Pitts
University of North Carolina, Hwy. Safety Res. Center, Chapel Hill, N.C. 27514
1974; 33p 4refs
Supported by the North Carolina Governor's Hwy. Safety Prog., proj. 304-75-001-001.
Availability: Corporate author

HS-021 688

DRIVER LICENSE ROAD TESTING - FINAL REPORT

A review is given of a series of studies on the use of instrumented vehicles, simulators, and vision parameter measuring equipment in driver license application examinations. Also considered are studies of visual parameters and their relationship to driving, and studies concerning development of a simulator and measurement of hazard perception. The three instrumented vehicles differ in their measurement of variables; any statewide examination procedure would have to take this into account. A model test course has not yet been identified; the one-mile course used in state testing does, however, provide an adequate sample of straight uniform roadway. Results of tests of course differences are confusing, as are results of tests of variables measured by the instrumented vehicle. No variables are able to differentiate between drivers with zero accidents and drivers having one or more accidents, or between drivers having zero violations and those having one or more violations. The driver licensing program of North Carolina should not use the instrumented cars in any statewide driver licensing effort until further testing shows that the cars can measure variables which are important to the determination of how good or how poor a driver is or until other instrument packages are developed and tested. Studies of visual patterns and driving ability showed that drugs and alcohol can affect eye movement patterns and peripheral vision. Examiners are correctly using the available equipment in the measurement of visual fields. There is no evidence that persons with limited visual fields are involved in more than their share of accidents, regardless of age. Thus eye movement should not be used as a criterion of driving ability. Neither should the hazard judgment technique be used, since it does not discriminate between drivers with and those without accidents or violations. The development of a versatile driving simulator is feasible but too costly. None of the new technology appears very promising as driver licensing tools. Those who try new methods on a pilot basis and evaluate the results before implementing those methods are to be commended. Appended are detailed data on the instrumented vehicles, a progress report of driving simulator development, and a description of the methodology used in analysis of statewide baseline data.

by Forrest M. Council; John A. Allen, Jr.
University of North Carolina, Hwy. Safety Res. Center, Chapel Hill, N.C. 27514
1974; 58p
Availability: Corporate author

HS-021 689

AN EVALUATION OF THE 'HALO' EFFECT IN SPEED DETECTION AND ENFORCEMENT

A visual speed indicator (VSI) sign, static radar enforcement, a parked patrol car, and a simulated arrest scene were comparatively evaluated for their effectiveness in reducing vehicle speed on a rural, two-lane highway. Along with radar or VSI speed readings at the point of detection, individual point speed readings were recorded automatically 1.8 miles upstream and 2.0 miles downstream. Speed profiles within the first quarter mile to half mile past each treatment were recorded using a camouflaged ground mounted radar unit with a concealed operator. The experiment was replicated three times; a control situation of no VSI or police presence was also included. The use of the simulated arrest scene, speed check zone, and a parked patrol car all substantially reduced the mean, median, and 85th percentile speeds in the vicinity of the enforcement unit. All three enforcement techniques reduced the variability of speeds at the enforcement location, and significantly reduced or eliminated the percentage of vehicles traveling over the 55 mph speed limit. The VSI sign had no significant effect on vehicle speed and is no substitute for actual enforcement activity. The halo effect began to disappear at 1000 ft past the enforcement treatments and was completely lost by two miles downstream. A review of the literature of enforcement effectiveness is presented.

by Olin K. Dart; William W. Hunter
University of North Carolina, Hwy. Safety Res. Center, Chapel Hill, N.C. 27514
1976?; 40p 21refs
Presented at the 55th Transportation Res. Board Annual Meeting, Washington, D.C., 19-23 Jan 1976.
Availability: Corporate author

HS-021 690

METHODS FOR MEASURING EXPOSURE TO AUTOMOBILE ACCIDENTS

A comparison is made of induced exposure based on North Carolina 1971 (summer) accident reports with a statewide sample of driver license applicants, aged 20 or over, reporting to examining stations. Responsibility is determined in two-vehicle collision accidents. One discrepancy in the comparison indicates that single drivers could not be used for determining the distribution of guilty drivers in multivehicle accidents, as suggested by Thorpe, particularly in view of the close correlation between single drivers, 55 years old and over, and exposure to risk of accident. The comparison figures lead to the hypothesis that defensive driving is learned later than the avoidance of driving errors. Measures of driver exposure by the two methods of drivers' estimates and of a State Hwy. Commission origin and destination survey produced nonidenti-

cal results, the differences attributable to measuring errors or uneven mileage driven on different days of the week. Differences between the direct and indirect exposure methods, assuming correct reporting of mileage, correct determination of guilt in accidents and correct induced exposure curve concept by Thorpe, can be attributed to measuring exposure wholly in terms of vehicle miles, ignoring duration of exposure, a time factor. Use of vehicle mileage to indicate exposure assumes that speed is essentially equal for different groups of drivers. Also assumed is a homogeneity of road conditions and traffic congestion. These assumptions are unwarranted. The induced exposure concept presents the difficulty of verification of its measurements. In order to be useful, the measures must be associated with a well-defined, confirmable pattern or parameter of roadway phenomena or the theory must be otherwise substantiated.

by Patricia F. Waller; Donald W. Reinfurt; Jean L. Freeman; Peter B. Imrey
University of North Carolina
1973; 17p
Presented at American Public Health Assoc. Annual Meeting (101st), San Francisco, 8 Nov 1973.
Availability: Reference copy only

HS-021 691

PAVED HIGHWAY SHOULDERS AND ACCIDENT EXPERIENCE

Cost-effectiveness of paving rural primary highway shoulders was studied using a methodology which compared the accident experience between highway sections similar in all respects, except for the presence or absence of a paved shoulder. The generally lower accident rate on paved shoulder highways is translated into dollar benefits and related to a range of paved shoulder construction costs and traffic volumes for the purpose of constructing cost-effectiveness graphs. A brief historical review of the problem is given, the data base used for analysis, techniques employed for construction of highway classification tables, an analysis of accident data, the translation of highway accident experience into accident costs, the development of cash-flow tables to relate paved shoulder construction costs to accident benefits, and the construction of cost-effectiveness graphs for paved shoulders.

by Clinton L. Heimbach; William W. Hunter; George C. Chao
University of North Carolina, Hwy. Safety Res. Center,
Chapel Hill, N.C. 27514
1974; 7refs
Reprinted from Transportation Engineering Journal v100 nTE4 p889-907 (Nov 1974).
Availability: Corporate author

HS-021 692

A STUDY OF THE EFFECT OF THE SPEED CHECK ZONE CONCEPT

A study determined whether the display of a warning sign designating a speed check zone affects the speed characteristics of drivers. Two sections of N.C. highway, one 12 miles long and the other 20 miles long, were set up with five monitoring stations each. Speed data were gathered under three conditions: warning signs displayed between first and second measuring stations in addition to prominent display of a patrol car at the middle station; patrol car but no signs; and neither sign nor patrol car. The data reflected an alteration in motorists' driving performance only when a patrol car was visible; the speed check zone sign had little if any effect. Explanations suggested are: poor experimental design of the test areas; ignorance of the meaning of the sign by the public; limitations in the proper use of the signs by the patrol; inconspicuousness of the sign. Recommendations are to continue this type of experimental program coupled with evaluation. All types of speed-monitoring equipment should be used; there should be more instances where multiple vehicles are used. Locations of the enforcement vehicles should be varied, to avoid a definite pattern; the signs should be made as self-explanatory as possible, and their use selectively and periodically publicized. They should also be made more highly visible.

by William W. Hunter; Henry L. Bundy
University of North Carolina, Hwy. Safety Res. Center; North Carolina State Hwy. Patrol
1975; 47p 4refs
Availability: Reference copy only

HS-021 693

MOVING RADAR EVALUATION: PROJECT REPORT

Moving radar units known as MR 7 units, 50 of which were leased by the North Carolina Hwy. State Patrol on a trial basis, were evaluated for their reliability and their impact on speed law enforcement. The operational design of the unit is based on the doppler effect; it is selfcontained and capable of being moved from car to car. It gives a digital reading of mph, rounded down to the nearest mile except for a .9 reading. Reliability data were obtained by field observations in which clocked vehicles were measured in trial runs of the following maneuvers: day, moving, four-lane; day, stationary, four-lane; night, moving, four-lane; and night, stationary, two-lane. The stationary mode was slightly more accurate than the moving mode, but in no case was the error more than 1 mph. Data were collected by patrolmen in the field and compared with data on patrol activity published by the Dept. of Motor Vehicles. The rate of citations issued increased, but the data must be considered in the light of other factors such as a policy change emphasizing speeding violations, the novelty effect of the device, and the lingering effects of the fuel shortage. Nevertheless, the new moving radar units result in a higher rate of speed violation detection on a per month basis due to the capacity of the devices to monitor a greater amount of traffic in a given amount of time. Relatively more violators were detected in the following circumstances: from moving patrol cars, on two-lane roads, moving towards patrol cars, per hour of patrol duty, and per each moving radar unit. The importance of the level of effort in detecting speed violators is shown by the fact that there was also an increase in detection in counties having no moving radar units, and that that increase was slightly greater than the increase in counties using the new units. The MR 7 units are very popular among the members of the State Hwy. Patrol.

by William W. Hunter; Henry L. Bundy
University of North Carolina, Hwy. Safety Res. Center,
Chapel Hill, N.C. 27514
1975; 44p 4refs
Availability: Corporate author

HS-021 694

WHEEL REMOVAL AND THE DETECTION OF BRAKE DEFECTS IN NORTH CAROLINA

The feasibility and desirability of upgrading North Carolina's Periodic Motor Vehicle Inspection program to include a more in-depth brake examination was investigated. Proposed additions to the examination were wheel removal and measurement of the thickness of friction surfaces. A sample of brakes from the inspection population was examined to help determine the extent to which such problems as fluid leakage, faulty grease seal, broken springs, cracked drums, and broken adjusters occur. Vehicles examined were those recently involved in towaway accidents and those placed in salvage yards, those coming in for inspection, and those coming in for brake repair work. It was found that the friction surfaces on brakes do deteriorate with time and mileage, but most of the vehicles in the population at risk have more than the minimum requirement. The general condition of brakes in the population is good for all but the oldest vehicles. Although brake defects play a large role among vehicle defects, they represent a relatively small contributing factor in crashes. Brake defect accidents cost on the average slightly less than other accidents and cause less severe injuries as compared to an overall sample of accidents. Only 10% of the vehicles coming in for inspection had defective brakes. As for vehicles coming in for brake work, linings were poorer than those of the general population but were generally above Federal standards. Surprisingly, brake linings of vehicles involved in towaway accidents and in salvage yards had better than average brake linings. Vehicles with defective brakes represent no more than 1.8% of vehicles involved in crashes, and 1.8% of all accident-related costs. In terms of driver injury, brake defect accidents are slightly less serious than an overall sample of accidents. A more stringent wheel removal program does not appear warranted for North Carolina. Five to ten minutes of time would be necessary to remove one wheel and inspect one brake; the cost would be an additional $2 to $4 (the present inspection fee is $3.10). The proposed wheel removal program would detect only an additional 7% of defective vehicles. Present inspection laws should be enforced more carefully; leaks should be detected, since they are the most probable cause of brake problems and result in total rather than partial brake loss.

by Michael G. Sadof
University of North Carolina, Hwy. Safety Res. Center, Chapel Hill, N.C. 27514
1977; 77p
Sponsored by the North Carolina Governor's Hwy. Safety Prog.
Availability: Corporate author

HS-021 695

POLICE TRAFFIC SERVICES. PROJECT REPORT

Evaluation was made of the worth of VASCAR, a new type of speed measuring equipment used in enforcement programs in North Carolina by gathering before publicity and after publicity data on vehicle speeds in four different cities. It was hoped that the immediate effect of the device would be a lowering of the mean speed to a speed under the posted speed limit if previously above it, and a reduction in the percentage of vehicles traveling at speeds well above the posted limit. Statistical analysis was made by computer. Tabulated data include the following: sample size for all data cells, both moving measurements and stationary measurements; mean deviation from posted speed limit; frequency and percentage of clocked speeds in each speed group, and by both moving and stationary clocks. Results among the four cities were not consistent, but in two of the four cities there was a significant reduction in mean speed in relation to the posted speed limit and a significant reduction in the percentage of vehicles traveling at speeds well over the speed limit. Cooperation of police agencies in such studies is essential. Convincing information needs to be presented to police agencies about the evaluation, and it should be stressed that the police agency itself is doing its own evaluation. There should be better built-in study designs, and Police Traffic Service should have good on-going evaluation. Appended are an evaluation of the effects of speed detection devices in cities, sample instruction sheet and data form, and correspondence and publicity concerning the program.

by Forrest M. Council
University of North Carolina, Hwy. Safety Res. Center, Chapel Hill, N.C. 27514
1971; 46p
Yearly rept. for Apr-Dec 1970 on Proj. No. PT-70-017(001), "Evaluation of Police Traffic Services."
Availability: Corporate author

HS-021 696

ANALYSIS OF THE BENEFITS DERIVED FROM CERTAIN PRESENTLY EXISTING MOTOR VEHICLE SAFETY DEVICES: A REVIEW OF THE LITERATURE

Literature on the effectiveness of crash protection devices introduced into automobiles in the 1960's includes reviews on lap belts, shoulder belts, energy-absorbing steering columns, high penetration-resistant windshields, head restraints, and side door beams. Only those articles which evaluated safety devices by sampling real world accidents were reviewed. Lap belts reduce injury severity to drivers by about 40%-50%, and to frontseat passengers by about 30%-40%; they increase the probability that an occupant will sustain no injury during an accident. Shoulder belts reduce injury by about 50%-60% most studies of their effectiveness have been done in foreign countries. Energy-absorbing columns are designed to reduce injury severity in front-end accidents; they may reduce death and injury by 5%-10%. High penetration-resistant glass reduces frequency and severity of facial injuries, and to a lesser extent it reduces fatalities. Head restraints reduce probability of injury 2%-3%; they do not reduce fatality rates. Women are benefitted more than men. Most head restraints are improperly adjusted. There are as yet insufficient data on effectiveness of side door beams, since the beams did not become standard equipment on passenger cars sold in the U.S. until 1 Jan 1973. In general, the most marked improvement has been in safety changes associated with front-end accidents: drivers of 1971 model vehicles were only half as likely to be killed or seriously injured as drivers of 1961 model vehicles. Review of the literature shows that evaluations of the safety benefits of the various devices are by no means in agreement.

by Lindsay I. Griffin, 2nd.
University of North Carolina, Hwy. Safety Res. Center, Chapel Hill, N.C. 27514
1973; 52p 39refs
Supported by funds from Motor Vehicle Manufacturers Assoc. Agreement No. ECON-3-HSRC.
Availability: Corporate author

HS-021 697

FATAL CASE STUDY ANALYSIS

North Carolina fatal traffic accidents were compared with nonfatal accidents to determine how they differed. The study involved subjective study of randomly selected accident reports, analysis of the 1973 accident data tape, analysis of the narrative descriptions from traffic reports, examination of the Fatal Analysis File, and analysis of supplemental data. In the subjective study of accident reports (250 each fatal and nonfatal, with injury data blocked out), most nonfatal accidents were determined to occur when the driver was moderately involved and the vehicle and the environment minimally involved. On the other hand, most fatal accidents were determined to have occurred when the driver was either moderately or maximally involved and the environment and vehicle minimally involved. Computer analysis of 1973 accident reports revealed characteristic features of fatal accidents, including the following: occurrence during summer and fall months; occurrence on weekends, and nighttime; clear weather and dry road conditions; rural paved roads; male driver; probable alcohol involvement; vehicle moving straight; high speed; running off the road or head-on impacts; disproportionate involvement of trucks and motorcyclists; defective tires and steering mechanisms; impact of passenger area; and rollovers. Analysis of the narrative descriptions of accidents written by police officers yielded descriptions of circumstances characteristic of running off the road accidents, pedestrian accidents, intersection accidents, and head-on collisions. Analysis of North Carolina accidents in the Fatal Analysis File (FAF) of the National Hwy. Traffic Safety Administration resulted in frequency distributions of data elements consistent with those of previous studies; no new insights regarding fatal crashes were derived. The final data analysis was of North Carolina fatal accidents of Apr-Jun 1975. It showed that almost all the accidents were attributable to some driver or pedestrian error. Most pedestrian victims had been drinking. Cause of injury and place of death and fatal wounds are tabulated.

by Lindsay I. Griffin, 3rd; Elizabeth Leggett; Catherine Mullen; Brian Powers
University of North Carolina, Hwy. Safety Res. Center, Chapel Hill, N.C. 27514
1975; 121p
Proj. No. 310-75-002-001 of the Governor's Hwy. Safety Prog.
Availability: Corporate author

HS-021 698

ON INFERENCE FROM GENERAL CATEGORICAL DATA WITH MISCLASSIFICATION ERRORS BASED ON DOUBLE SAMPLE SCHEMES

In order to resolve the difficulties involved in inference from a sample of categorical data obtained by using a fallible classifying mechanism (usually inexpensive), consideration is given to utilization of a subsample subjected to a simultaneous cross-classification of its elements by the fallible mechanism and by some true (usually expensive) classifying mechanism. The setup is general; the discussion can be applied to any multidimensional cross-classified data obtained by unrestricted random sampling. Two methodologies are presented: maximum likelihood approach and least squares approach. Both methodologies are illustrated using real data. The first example concerns evaluation of the effectiveness of lap and shoulder belts in reducing injuries of automobile accidents, using only the variables of belt usage and injury. The second example adds to the first the variables of vehicle damage severity and driver gender.

by Yosef Hochberg
University of North Carolina, Hwy. Safety Res. Center, Chapel Hill, N.C. 27514
1976; 24p 13refs
Reprint of Inst. of Statistics Mimeo Series No. 1066.
Availability: Corporate author

HS-021 700

TWO STAGE RANDOMIZED RESPONSE SCHEMES FOR ESTIMATING A MULTINOMIAL

The three existing methods of estimating a multinomial by the randomized response technique are summarized: Warner's, (1965); Abul-Ela et al., (1967); and Greenberg et al., (1969). In all these schemes there is a loss in efficiency resulting from their low sensitivity to the relation between stigmatizing and nonstigmatizing groups. Good randomized response schemes give protection to individuals in stigmatized groups while minimizing protection or removing uncertainty for those in nonstigmatizing groups. New procedures are outlined for estimating the main group proportions using only one sample. Their realizations for any sampled individual constitute two-stage schemes; the second stage is conditional on the random individual's response in the first stage. After a description of these procedures and resulting estimators, they are identified as special cases of Warner's (1971) general linear randomized response model, thereby obtaining alternative estimators based on modified generalized least squares method due to Zellner (1962).

by Yosef Hochberg
University of North Carolina, Hwy. Safety Res. Center, Chapel Hill, N.C. 27514
1975; 22p 7refs
Availability: Corporate author

HS-021 701

SIMULATING THE VISUAL ENVIRONMENT IN REAL-TIME VIA SOFTWARE

The Visual Environment Simulator (VES) is a black-and-white approximation of the General Electric-National Aeronautics and Space Administration spaceflight simulator, adapted for highway environment simulation and implemented in software. The software runs on a stand-alone IDIIOM-2 interactive graphics terminal consisting of a display processor, a VARIAN 620f minicomputer, and a program function keyboard. The display processor is itself a computer, reading and executing its program (called a display file) from the core of the minicomputer on a cycle-stealing basis. The display processor's instruction set is extensive, but the visual simulator uses only a few instructions. Those used are instructions to draw horizontal vectors at varying vertical positions on the screen. The speed of the display processor allows a display file of 7000 instructions to be executed in about 1/30th of a second, effectively preventing image flicker at low light levels. Core of the minicomputer has a 750 nanosecond cycle time and most instructions require two cycles; word size is 16 bits and core size is 16,384. The resulting image is as sharp as any television frame and comparable to a photograph. In a recent test run involving a simple terrain data set the VES took 30 seconds to produce 300 frames, maintaining the illusion of continuous mo-

tion for all but the highest rates of angular velocity encountered in a typical highway environment. The appendix presents an outline of the hidden surface removal algorithm as processed by LINESCAN.

by Raymond S. Burns
University of North Carolina, Hwy. Safety Res. Center,
Chapel Hill, N.C. 27514
1972; 9p 4refs
Presented at Fall Joint Computer Conference, 1972.
Availability: Corporate author

HS-021 702

PROJECT SELECTION FOR ROADSIDE HAZARDS ELIMINATION. VOL. 1. FINAL REPORT

A computerized system to prioritize roadside fixed-object treatments performs economic analyses of various fixed object improvements on an areawide or roadway segment basis. An example is the determination of the effect of removing all trees within 30 ft of the edge of pavement on rural, two-lane, secondary roads in the Piedmont area. Inputs to the economic analyses include a determination of the frequency and severity of the most affectable accidents for a given hazard/treatment combination, the expected reductions in fatal, injury, and property damage-only accidents, and initial costs, maintenance costs, and repair costs over the service life of each treatment. A net discounted present value and a benefit/cost ratio is computed for each candidate fixed-object treatment, and a priority ranking is developed based on comparisons of net present value. Fixed-object hazards considered include utility poles, trees, exposed bridge rail ends, substandard bridge rails, bridge piers (underpasses), rigid sign and luminaire supports, guardrail ends, and median-involved accidents. Data files used to develop the estimates of hazards and affectable accidents include the Traffic Engineering Branch's Roadside Fixed Object Hazards Inventory, North Carolina accident tapes for 1973-1975, and the North Carolina Div. of Highways' mileposted accident tape, mileage inventory file, and structures file.

by William W. Hunter; Forrest M. Council; Amitabh K. Dutt
University of North Carolina, Hwy. Safety Res. Center,
Chapel Hill, N.C. 27514
1977; 201p 219refs
Vol. 2 is HS-021 703.
Availability: Corporate author

HS-021 703

PROJECT SELECTION FOR ROADSIDE HAZARDS ELIMINATION. VOL. 2. USER MANUAL FOR ROADSIDE HAZARD CORRECTION RANKING PROGRAM

The Roadside Hazard Correction Ranking (RHCR) program for which the user manual is presented prioritizes roadside fixed-object treatments by performing economic analyses of various fixed object improvements on an areawide or roadway-segment basis. The program is written in PL 1 language (F compiler). The manual deals with overall program logic, matrix input decks, user input cards, system outputs, program operation, modification, and error codes. Appended reference material includes a complete listing of input matrix, program listings, algorithms used in row-collapse module, a listing of valid hazard/treatment/segment combinations, and an example of an analysis procedure.

by Forrest M. Council; Amitabh K. Dutt; William W. Hunter; Anita Y. Leung; Nancy C. Woody
University of North Carolina, Hwy. Safety Res. Center,
Chapel Hill, N.C. 27514
1977; 131p
Vol. 1 is HS-021 702.
Availability: Corporate author

HS-021 704

TRAFFIC RECORDS--AIDS TO DRINKING DRIVER CONTROL

The relationship of crash severity to intoxication was investigated by study of motor vehicle crashes investigated by the North Carolina State Hwy. Patrol in 1972. Likely characteristics of alcohol-impaired drivers include the following: unlicensed, male, young, unrestrained, driving an older car, having an accident on a weekend, at night, in clear weather, at high speeds, with single-vehicle involvement. Severity-associated variables include high speed, single-vehicle involvement, and nonuse of restraints. The association between alcohol and driver injury holds even while other relevant variables are controlled, including the measure of physical damage to the vehicle. As blood alcohol concentration (BAC) increases, there is an increase in the proportions of weekday crashes, older drivers, and older vehicles; there is a decrease in the proportions of nighttime crashes and high-speed crashes. Serious injury and serious vehicle damage tend to increase with increasing BAC except for the 0.15-0.19 range.

by Elizabeth G. House
University of North Carolina, Hwy. Safety Res. Center,
Chapel Hill, N.C. 27514
1975; 9p 3refs
Availability: Corporate author

HS-021 705

HAVE THE SCHOOLS FAILED?

In a comparison of the demands made on school driver education programs as opposed to the expectations held for other traditional courses, in terms of subsequent student performance, it is suggested that the expectations of driver education have exceeded anything that could reasonably be accomplished. Two general goals are cited. First, the program should provide basic instruction in driving techniques, knowledge of how to handle a car in special circumstances, environments and emergencies, and a knowledge of local and state motor vehicle and traffic laws and ordinances. Second, the course should produce a more knowledgeable individual, sufficiently aware of highway safety to demand and support higher safety standards. The first goal is realistic for a driver education course, but the second demands much more than a single course. Suggestions are made for the development of materials to be used throughout the school curriculum to increase the student's awareness of traffic safety. For instruction in actual driving and in traffic law, a program of collaboration between the school and the home could lead to a graduated driver license, whereby the young driver is introduced more gradually into the driving population on the basis of experience and demonstrated skill. This would require the coor-

dinated efforts of driver education instructors, driver license administrators, enforcement personnel, and parents.

by Patricia F. Waller
University of North Carolina, Hwy. Safety Res. Center, Chapel Hill, N.C. 27514
1973; 18p 13refs
For presentation at the Annual American Medical Assoc. - American School Health Assoc. Session on School Health, New York, N.Y., 24 Jun 1973. Supported in part by the (N.C.) Governor's Hwy. Safety Prog.
Availability: Corporate author

HS-021 706

DEVELOPMENT OF PREDICTIVE MODELS TO IDENTIFY PERSONS AT HIGH RISK OF ALCOHOL RELATED CRASH INVOLVEMENT

From the literature and existing data sources several groups were selected who were likely to be at high risk of alcohol related (A/R) crashes; for each group a predictive model was developed to identify those smaller subgroups of individuals at a further heightened risk of A/R crash involvement. The high risk groups selected for modeling were two age groups of young males (16-20 and 21-24), persons previously convicted of driving under the influence of alcohol, persons with three or more moving traffic violations, persons recently divorced, and persons recently released from prison. Additionally a model was constructed on a 1/10 sample of the general driving population. The objective of the statistical analysis was development of a predictor model for A/R crashes using as independent variables those data elements which are most strongly associated with A/R crashes. The development of multivariate models for the prediction of probabilities of alcohol related crash involvement entailed two separate phases: the first involved selecting a subset of those variables descriptive of events prior to 1975 and most strongly related to 1975 crashes from among the many possible variables available on the data file; the second phase consisted of fitting categorical regression models to the populations defined by the variables selected in phase one. A series of tables presents data and predictions for each subgroup. A test of their predictive accuracy was currently being conducted; the true value of models developed using this approach cannot be assessed until results of the prospective validity tests are in. It may indeed be possible to develop better predictors of A/R crash involved drivers utilizing information available to real-world program administrators.

by John H. Lacey; J. Richard Stewart; Forrest M. Council
University of North Carolina, Hwy. Safety Res. Center, Chapel Hill, N.C. 27514
Contract DOT-HS-5-01250
1977; 29p 21refs
Presented at the 7th International Conference on Alcohol Drugs and Traffic Safety; Melbourne, Australia, 23-28 Jan 1977.
Availability: Corporate author

HS-021 707

CLASSIFIED LICENSING: DEVELOPMENT OF PROCEDURES AND MATERIALS. VOL. 1. EXECUTIVE SUMMARY

An executive summary refers to the specific reports (appendices) of which the four-volume series is composed; in addition, the first three of those appendices are presented. The format and text for a proposed classified licensing brochure are presented, a list is given of persons, agencies, and organizations to be contacted concerning classified licensing with sample letters, and a cost analysis is made of printing driver manuals.

by Patricia F. Waller; Livia K. Li; Susan S. Padgett; Robert G. Hall; Henry A. Lowery
University of North Carolina, Hwy. Safety Res. Center, Chapel Hill, N.C. 27514
1976; 41p
Vols. 2-4 are HS-021 708--HS-021 710.
Availability: Corporate author

HS-021 708

CLASSIFIED LICENSING: DEVELOPMENT OF PROCEDURES AND MATERIALS. VOL. 2. APPENDICES. LICENSING OF MOTORCYCLE OPERATORS

The four appendices of which the report is composed concern analysis of motorcycle knowledge and skill tests, evaluation of the effectiveness of motorcycle licensing programs in other states, motorcycle coverage in manuals of other states, and a manual for motorcycle operators with illustrations. Two groups of motorcyclists (one experienced, the other inexperienced) were tested for correlation between knowledge tests and performance skills, and for correlation between knowledge, skills, and driver test performance in comparison with background variables. Results show that a proposed motorcycle skill test would be a psychometrically sound instrument by which to evaluate applicants for license to operate a motorcycle. Study of motorcycle licensing programs in various states tentatively suggests that special licensing of motorcycle operators can be effective, and that the inclusion of an in-traffic skill test may increase program effectiveness. Examination of motorcycle operator's manuals of various states shows that areas usually covered include licensing and/or registration and protective equipment and/or clothing. The North Carolina manual is more thorough than that of most other states listed; it is presented in its entirety, and includes the following chapters: introduction; licensing and registration; protective equipment; location and operation of controls; general maintenance; lane position; maneuvering turns and curves; city driving; freeway and country driving; group riding; passengers and packages; hazards and how to deal with them; emergencies; borrowing and lending; and diagram of the skill test.

by Patricia F. Waller; Susan S. Padgett; Livia K. Li; Henry A. Lowery; Robert G. Hall
University of North Carolina, Hwy. Safety Res. Center, Chapel Hill, N.C. 27514
1976; 112p
See also HS-021 707, HS-021 709, and HS-021 710.
Availability: Corporate author

HS-021 709

CLASSIFIED LICENSING: DEVELOPMENT OF PROCEDURES AND MATERIALS. VOL. 3. APPENDICES. LICENSING OF OPERATORS OF LARGE TRUCKS AND BUSES

The seven appendices of which the report is composed provide a summary of information provided by the North

Carolina Bus Assoc. on the selection and training of bus operators, and information on North Carolina trucks and buses in crashes and on the vehicle registration file. Also provided are the truck operator manual with proposed illustrations, truck operator knowledge tests with answer keys, and bus operator knowledge test with answer key. In addition, the development and analyses of truck operator knowledge test items and development of final test forms are described, as are the proposed classes of license and procedures for authorization of companies and certification of drivers in lieu of skill testing at examination stations. Crash data on North Carolina buses and trucks are limited in a number of ways. Under a system of classified licensing, operators of large trucks would be required to demonstrate special knowledge and skill. The tests were developed by pilot testing a large number of items, analyzing the results, and choosing 75 items compiled into three independent forms of 25 items each.

by Patricia F. Waller; Robert G. Hall; Livia K. Li; Susan S. Padgett; Henry A. Lowery
University of North Carolina, Hwy. Safety Res. Center, Chapel Hill, N.C. 27514
1976; 129p 4refs
See also HS-021 707, HS-021 708, and HS-021 710.
Availability: Corporate author

HS-021 710

CLASSIFIED LICENSING: DEVELOPMENT OF PROCEDURES AND MATERIALS. VOL. 4. THE EXTENT AND DISTRIBUTION OF FUNCTIONAL ILLITERACY IN NORTH CAROLINA AS DETERMINED BY THE USE OF THE ORAL DRIVER LICENSE EXAMINATION

Data collected by driver license examiners in North Carolina for a three-week period showed variations in the use of the oral driver license examination, itself an indication of functional illiteracy. Data on over 70,000 applicants included race, gender, age category, whether original or renewal application, whether tested by oral or written exam or exempted from knowledge testing, and whether passed or failed. Older applicants and nonwhite applicants were more likely to take the oral version of the test. Males generally took the oral exam more frequently than did females, with the exception of white females applying for license renewals, a remarkably high proportion of whom took the oral version of the test. The western part of the state shows a much lower percentage of applicants taking the oral exam while the eastern area has the highest use. Use of the oral exam has declined from 20% in 1959 to 6.7% of original applicants and 11.3% of renewal applicants in this survey. The data presented are precise to the county level, and help pinpoint groups needing remedial reading programs. Oral exam data by county are appended.

by Patricia F. Waller; Robert G. Hall
University of North Carolina, Hwy. Safety Res. Center, Chapel Hill, N.C. 27514
1976; 147p 4refs
See also HS-021 707--HS-021 709.
Availability: Corporate author

HS-021 711

THE NORTH CAROLINA TEST WAIVER LAW: AN EVALUATION OF ITS IMPACT. FINAL REPORT

Since passage in 1974 of the North Carolina legislation exempting applicants for renewal driver licensing from knowledge and road testing if they had no conviction for moving violations during the preceding four years and no physical or mental impairment to affect their driving, a careful evaluation has been made of results. A study has been made of effects of the legislation on overall driver licensing activity, on violations and accidents to determine whether the new procedures result in differential screening of applicants, and the subsequent driving performance of applicants to determine whether the program shows any incentive or reward effect. Both operator and chauffeur applicants were examined, and a small group of high mileage chauffeurs was identified and the crashes they were involved in were examined. Three driver record categories were set up: clean, no violation; soiled, small number of less serious violations; dirty, high activity records or serious violations. The vast majority of operator applicants were in the clean category; less than half of the chauffeurs were. Only 9% of operator applicants fell in the dirty category compared to 22% of the chauffeurs. When the per applicant population rates for violations were examined it was found that clean drivers showed a positive or at least nondetrimental effect of the test waiver program, with the possible exception of young drivers who showed an increase in certain types of violations. However, young drivers with prior activity on their records and dirty drivers who renewed under the test waiver program both showed significantly more violations subsequent to renewal than similar groups who renewed before the test waiver program was implemented. The major finding was that the program was associated with a decrease in the accident rate for males with dirty records and thus was beneficial. Recommendations are that the program remain in effect for operator applicants except for drivers below the age of 25; that it be continued for chauffeur applicants; and that in view of the apparently deleterious impact of the test waiver program on dirty operators, a special investigation should be conducted of the road test to determine how it functions in relation to subsequent driving performance.

by Patricia F. Waller; Robert G. Hall; Susan S. Padgett
University of North Carolina, Hwy. Safety Res. Center, Chapel Hill, N.C.
1977; 98p 11refs
Prepared for the North Carolina Div. of Motor Vehicles in cooperation with the Governor's Hwy. Safety Prog. and the National Hwy. Traffic Safety Administration.
Availability: Corporate author

HS-021 712

THE DRIVER LICENSE RULES TEST: THE INCIDENCE AND FAILURE RATES OF THE ORAL VERSION COMPARED TO THE WRITTEN VERSION

For one week a tally was kept of the oral and written tests given to North Carolina applicants for original licenses, renewals and permits; 4623 tests were collected from urban and rural areas. The oral test was taken by 12%, who had a failure rate of 44% compared to 33% for the written test. Two possible reasons are suggested for the higher oral test failure rate; that the test may be harder than the written, in both for-

sample could not control for factors such as age, sex, race, educational level, intelligence, and socioeconomic status; however the influence on the choice of oral test and the failure rate by license categories and localities was explored. Rural areas had a higher total failure rate than urban, and the rural failure rate was highest in oral tests. Compared to original and renewal applicants, permit applicants were more likely to choose the written rather than the oral tests, indicating a higher literacy level in young age groups. The permit failure rate was high overall, but highest for written tests taken in rural areas. The original license applicants had significantly higher failure rates in oral tests in rural areas. For the renewal license group failure rates were significantly greater in rural areas for both oral and written tests. Further study and improvement of the oral exam is recommended.

by Judith McMichael; Patricia F. Waller
University of North Carolina, Hwy. Safety Res. Center, Chapel Hill, N.C. 27514
1973; 15p
Availability: Corporate author

HS-021 713

DEVELOPMENT OF DRIVER PERFORMANCE MEASURES FOR USE IN THE NORTH CAROLINA LICENSING PROGRAM: A STUDY PLAN

Steps necessary for better utilization of existing North Carolina driver evaluation data are outlined, and recommendations are made of methods for developing more effective and logically defensible measures of driver ability. The state licensing program is seen as a continuing process of evaluating driver fitness to perform for as long as a license is retained. The initial phase of the program deals with available information from the driver licensing program of the State of North Carolina in order to define the effectiveness of the existing driver evaluation techniques. The second phase deals with adapting the most acceptable materials from the present evaluation procedures, modifying them as indicated, and specifying how new driver evaluation materials are to be prepared. Study phase three describes procedures for administration of the experimental measures to various samples of drivers and the development of a variety of short and longer term criterion measures or outcomes that reflect postlicensing driver capability. The fourth phase uses the best of the modified and newly designed measures in a validation study, in order to determine the relationship of the driver licensing measures to the criterion measures of postlicensing driver performance. The final phase involves further refinement in the measures and cross-validation of prior results in order to verify their value in an operational setting. Appended are items of the driver road test, and the personal data forms for both original and renewal license applicants.

by Norman E. Freeberg
Educational Testing Service
1970; 60p 39refs
Supported by Univ. of North Carolina, Hwy. Safety Res. Center.
Availability: Corporate author

HS-021 714

NORTH CAROLINA DRIVER LICENSING EXAMINATIONS UNC1-5. TEST ANALYSIS

Statistical data are presented of an analysis of 3902 driver license application tests taken on 7 Jun 1972 in North Carolina. Data include total-group score distributions, as well as data for each of five sample groups ranging in size from 760 to 800. The test was well suited to the group: each form was near middle difficulty, on the average. Reliability estimates are .72 to .80, with standard errors of measurement 2.1 or 2.2. Mean deltas of item difficulty were 11.3 to 11.6; middle-difficulty reference value was 11.7. Mean biserial correlation was .47 to .53 with 25-item total scores as criteria.

Educational Testing Service, Princeton, N.J. and Berkeley, Calif.
Rept. No. SR-72-60; 1972; 16p
Supported by Univ. of North Carolina, Hwy. Safety Res. Center.
Availability: Corporate author

HS-021 715

DEVELOPMENT OF MEASURES FOR A DRIVER LICENSING PROGRAM IN THE STATE OR NORTH CAROLINA. PHASE 1: ANALYSES OF CURRENT LICENSING TESTS

The written test of rules used for both original and renewal driver licenses is evaluated by such factors as item means (difficulty levels), variances, correlations of items with the total test score, reliability of the total test, underlying dimensions or factors defining the test content, and overall comparability of various test forms that are administered interchangeably. The rules test (for license renewals) is also analyzed in terms of its capability of discriminating between good and poor drivers in terms of incurred accidents and violations. Item characteristics, form reliability, test factors, and form comparability are given for both the initial and the renewal licensing rules test. The tests were too easy, particularly the renewal test. Levels of internal consistency were adequate, however. Factor patterns were almost entirely uninterpretable; there appeared to be no coherent, identifiable areas of driver knowledge or skill being measured except for a general knowledge of the driver handbook. Validity testing of the renewal tests showed that only one form (Form C) showed any degree of potential value as indicative of the quality of the driver. Only with the addition to the rules test scores of driver background data were any reasonable levels of relationship with the accident-violation criteria found. Test items need to be constructed with more defensible measurement characteristics. There should be an approach to knowledge-judgment measures which defines specifically what is being evaluated. A wider range of driver characteristics and driving experience should be incorporated for investigation in any further predictive studies of licensing tests. More readily available standardized measures of driver performance need to be developed for use as defensible criteria. Test data are appended.

by Norman E. Freeberg; F. Reid Creech
Educational Testing Service, Princeton, N.J.
1971; 82p 18refs
Supported by Univ. of North Carolina, Hwy. Safety Res. Center.
Availability: Corporate author

HS-021 716

OBSERVED SHOULDER BELT USAGE OF DRIVERS IN NORTH CAROLINA: A FOLLOW-UP. FINAL REPORT

During Oct 1974, shoulderbelt usage was observed for 21,359 drivers in the population at risk in North Carolina. The sample was stratified according to geographic region (Mountain, Piedmont, Coastal), road type, urban/rural location, time of day, and day of week. Information was recorded on shoulderbelt usage of driver, his approximate age and sex, and license plate number of vehicle. For North Carolina vehicles, license plate numbers were later passed against the vehicle registration file to obtain the corresponding Vehicle Identification Numbers (VIN's) which provide information on vehicle make, size, and model year. Similar observations were made in Oct 1976 on a smaller sample of 3486 drivers in the Piedmont area only. Results show an overall shoulderbelt usage rate of 10.6% in 1974 and 7.9% in 1976. Usage rates were highest for drivers of newer (post-1973) and smaller-sized cars; rates were highest on interstates and among young drivers and among whites. To control for some of the most important factors in shoulderbelt usage (e.g. model year, geographic location) Maximum Likelihood techniques were utilized to fit log-linear models to the 1974 data. Separate models were constructed showing the effects of environmental, vehicle, and driver characteristics on shoulderbelt usage. Finally, the simultaneous effects of the more important variables among all three sets of factors were included in a final predictive model, which yielded fitted shoulderbelt usage rates across various factor level combinations. Regardless of the methodology used, it was apparent that drivers of passenger cars are not using lapbelts and shoulderbelts. However, since usage rates are higher among young drivers and in the newer model cars, an increase in belt usage may be hoped for.

by Yosef Hochberg; Jane C. Stutts; Donald W. Reinfurt
University of North Carolina, Hwy. Safety Res. Center,
Chapel Hill, N.C. 27514
Contract DOT-HS-4-00897
1977; 89p 24refs
Rept. for 15 Sep 1974-31 May 1977.
Availability: Corporate author

HS-021 717

AN ANALYSIS OF ACCIDENTS BY AGE

To understand the characteristics of accident-involved older drivers (defined as age 65 and over), a study was made of data involving drivers of passenger cars, including station wagons, who were in single-vehicle crashes, plus those in two-vehicle crashes who were considered by the investigating officer to be in violation. Analysis is made of distribution of accidents by age, type of accident, road characteristics and conditions, day of week and time of day, roadway feature, locality, posted speed, approximate speed at time of crash, year of car, vehicle maneuver, severity of crash, and exposure. A similarity between younger drivers and males can be seen, and a similarity between older drivers and females. Generally, speeding and reckless driving violations are committed by young drivers, while older drivers are more apt to be convicted of failure to yield, stop, and safe movement violations. Evidence indicates that older drivers have higher crash rates based on mileage; though one of the difficulties of special licensing procedures is that people do not age at the same rate, it is fairly obvious from statistical data that around age 55 the performance of drivers changes. This group data should be the basis for determining when screening procedures could be instituted for a gradual easing out of the older driver from the driving population as he becomes less capable.

by Patricia F. Waller; Elizabeth G. House; J. Richard Stewart
University of North Carolina, Hwy. Safety Res. Center,
Chapel Hill, N.C. 27514
1977; 26p 4refs
Presented at the Transportation Res. Board Annual Meeting, Washington, D.C., Jan 1977.
Availability: Corporate author

HS-021 718

EFFECTIVE PROBLEM IDENTIFICATION FOR STATES

Identification of problems in traffic safety programs is based on such data as driver history files, accident files, highway files, and driver education files. The design of the study can alter significantly the results. For example, in U.S. studies of cause of accidents, there is a tendency to consider vehicles and the environment as noncontributory just because they met current standards. Consequently, driver error rates are high. The limitations of existing data bases for study of possible problems associated with the moped, the older driver, school buses, and large trucks are considered. The question of exposure as a factor in judging safety records cannot readily be studied. Both the insurance companies and the Dept. of Motor Vehicles consider only absolute numbers of infractions, with no consideration for exposure. Driver improvement efforts may therefore be aimed at some drivers whose infraction rate on a mileage basis is already relatively low. Another problem of having infractions on the driver's file is the lack of even-handedness in convictions. For example, study of bias in North Carolina convictions shows that nonwhites, older drivers, and drivers of older vehicles are more likely to be convicted. Another aspect of problem identification concerns the compatibility of components within a traffic records system. Existing traffic record systems should be upgraded and special, short-term data collections should be conducted to study specific topics. Data that allow state administrators to identify a problem should also allow them to evaluate the impact of a given countermeasure.

by Patricia F. Waller
University of North Carolina, Hwy. Safety Res. Center,
Chapel Hill, N.C.
1977; 13p 9refs
Presented at Transportation Res. Board Workshop on Planning and Administration of Transportation Safety, Central Missouri State Univ., Warrensburg, Mo.
Availability: Corporate author

HS-021 719

DEVELOPING A METHOD FOR ROADSIDE HAZARD ELIMINATION IN NORTH CAROLINA

An economic analysis of various roadside safety improvements was made by use of a computerized system which determined the frequency and severity of the most affectable accidents for each treatment, based on North Carolina accident data. An areawide approach was used rather than a spot approach. In addition, the expected reductions in fatal, injury, and property-damage accidents for each treatment were analyzed. Benefits were developed based on accident savings

by assigning dollar costs to the accident types. A net discounted present value (NDPV) was derived for each hazard treatment by economic analysis, and a priority ranking was then developed. The hazards and their possible treatments included the following: for utility poles, breakaway poles, relocation to 30 ft from the edge of the pavement, and removal; for trees, cutting or both cutting and removal of stumps; for exposed bridge rail ends, transition guardrail; and for substandard bridge rail, an improved rail or thrie beam. Also considered were, for underpasses or bridge piers, concrete median barrier with end treatment or such attenuators as water-filled cushion, sand-filled cell, and steel barrels; for rigid signs or supports, breakaway fixtures or relocation behind guardrails; for guardrail ends, breakaway cable or turned-down Texas terminals; and for median-involved accidents, concrete median barrier or double-faced guardrail. Economic analyses for 942 basic hazard/treatment/road segment combinations were performed. The top ten treatments are tabulated, with data on percentage of accident reduction by accident type, initial costs, maintenance costs, repair costs, service life, and miscellaneous comments. The top ten treatment programs all concerned either bridge ends, cross-median involvements, or trees.

by William W. Hunter
University of North Carolina, Hwy. Safety Res. Center,
Chapel Hill, N.C.
1977; 33p 11refs
Presented at Southeastern Assoc. of State Hwy. and Transportation Officials, 36th Annual Convention, Asheville, N.C.
Availability: Corporate author

HS-021 720

IMPROVED HIGHWAY SAFETY PLANNING AND EVALUATION--THE NEED FOR ACCIDENT AND ROADWAY CHARACTERISTICS

A new data system has been developed in North Carolina which merges accident data and roadway characteristics into a usable computer system. Three basic user programs are described: the first is a general merge program which will match records from any or all of the system input files by county, route, and milepost as specified by the user who provides certain parameters; a merged output file will be written by the computer. The program is designed to build a file of data which can then be analyzed with either a canned analysis package or a specific purpose analytical program. The second major user program which already existed within the Div. of Highways but was revised to work with the new merge system is a features analysis program, which analyzes accident clusters on specific roadways around certain features. Finally, the sliding scale program uses a sliding scale or moving window technique to locate high accident roadway segments as defined by user input parameters. After locating which sections of a specified route have high accident rates, a summary of the accidents on each segment is printed along with information on each accident, if needed. The system is designed to be flexible and easily added to. The first two probable additions will be skid data which now exist as a paper file, and curve and grade data to be collected through a roadway inventory. The need for improved evaluation calls for involvement of the engineer with the evaluator, since the engineer knows what a design is supposed to do and can help avoid the use of wrong criteria. In ranking evaluation designs according to effectiveness, the before-after design traditionally used is not high-ranking. Problems connected with this design are cited, and the use of control groups with it is urged. In the need for better data in developing systems similar to this one, the engineer can control many of the variables but not accident data, probably the most important subset of information. To increase the accuracy of accident data, it is necessary to cooperate with the police in collection and organization of data. Sharing of information with fellow engineers and highway research organizations in other states is imperative.

by Forrest M. Council
University of North Carolina, Hwy. Safety Res. Center,
Chapel Hill, N.C. 27514
1977; 18p
Prepared for presentation at the Southeastern Assoc. of State Hwy. and Transportation Officials (SASHTO), 36th Annual Convention, Asheville, N.C., 25-28 Sep 1977.
Availability: Corporate author

HS-021 721

STUDYING THE DRIVER. THAT'S THE HIGHWAY SAFETY CENTER'S JOB

The Hwy. Safety Research Center at the Univ. of North Carolina, founded in 1966, attempts to evaluate the state's programs in the area of highway safety, to coordinate highway safety research efforts in the University, and to provide in-service training for state and other personnel pursuing highway safety interests. A study was made of the effects of a law (passed for a two-year period) allowing the court discretion in sentencing drivers convicted for the first time of driving under the influence: a limited driving privilege could be permitted, enabling the driver to continue working and in other ways maintain himself, while restricting his total driving privileges. It was found that the law resulted in a marked increase in cases found guilty as charged, and that recipients of the limited driving privilege, compared with a random sample, have a better record on the basis of violations, and no worse on the basis of accidents. Other studies include a Medical Evaluation Proj. for medically handicapped drivers, an examination of the effects of alcohol and drugs on driving skills, the use of instrumented vehicles and possibility of developing a driving simulator, and an investigation of how North Carolina drivers respond to enforcement, examining the effects of a parked patrol car versus a moving patrol car on the speed of oncoming traffic. Further studies include the effects of publicity on an enforcement program, the usage of seat belts, problems of young drivers and of motorcycle riders, and a long-term evaluation of the driver-licensing procedure in North Carolina.

by Patricia Waller
Publ: Popular Government p5-8 (May 1971)
1971
Availability: See publication

HS-021 722

DRIVER IMPROVEMENT CLINICS: A DRIVER OPINION SURVEY OF PARTICIPANTS

To find out from the North Carolina driver improvement clinic drivers themselves what kind of driving problems they have and what they think would help them, individual in-depth interviews were conducted. Random procedures were used in selecting clinics and drivers to participate; 15 clinics were included, with 265 interviews, while for those not interviewed,

information on certain background characteristics was obtained and compared with similar information from the interviewed drivers. Both groups present a similar profile: younger, as compared to the general driving population, more predominantly male and nonwhite, more often divorced or separated, more often employed in semiskilled or unskilled jobs, with higher mileage driving reported. Three types of driving problems were delineated: inexperience in driving, driving extensively, and driving under stress. Because of the diversity in nature of these problems, developing several different kinds of programs to meet their needs is suggested. The drivers also provided many ideas and suggestions concerning possible methods of help, including elimination of inequity in convictions for traffic offenses, the granting of a restricted driving license to speed offenders so they could drive to work, dissemination of current information on point system and driving regulations to out-of-state drivers, and changes in the driver improvement clinics themselves. All suggestions were considered so that future program changes may also reflect the inputs of the drivers themselves.

by Livia K. Li; Patricia F. Waller
University of North Carolina, Hwy. Safety Res. Center,
Chapel Hill, N.C. 27514
1976?; 74p 37refs
Availability: Corporate author

HS-021 723

AN EXAMINATION OF THE EFFECTS OF THE LOWERED MAXIMUM SPEED LIMIT AND FUEL SHORTAGES IN NORTH CAROLINA. FINAL REPORT

A variety of North Carolina data on vehicle mileage, traffic volumes, accident frequencies and severity, crash rates, and driver characteristics are examined in an effort to derive some insight into the nature of the changes that occurred during the peak of the energy crisis. An effort is made to identify those factors that may have had a significant influence on the lower number of fatal accidents. Most of the analyses involve a comparison of data for the first four months of 1973, 1974, and 1975. Where trends have been in effect for several years, certain variables such as overall vehicle mileage and accident rates are examined using techniques from time series analysis. The change of primary interest is that highway fatalities and overall accidents experienced dramatic reductions during this period, with fatalities continuing to remain below expected levels well after the peak of the crisis period. While the lowered maximum speed limit and reduction in traffic volume may be partially responsible for this improvement, the relative importance of these two factors is still debatable. So many factors were changing, with interacting variables such as speed, traffic volumes, and driver characteristics, and available data for some variables often crude and subjective, that it is almost impossible to single out and estimate the effect of any specific factor. With many complex, interactive, and sometimes contradictory changes in the North Carolina driving environment, it is demonstrated that reduced travel contributed significantly to the lower number of fatal accidents, while the lowered speed limit may have had more of an indirect rather than a direct impact on accident frequency.

by Andrew F. Seila; Mark A. Entsminger; Claudio Z. Silva
University of North Carolina, Hwy. Safety Res. Center,
Chapel Hill, N.C. 27514
Contract DOT-HS-4-00897
1977; 215p 19refs
Rept. for 1 Jul 1974-30 Jun 1977.
Availability: Corporate author

HS-021 724

AN ANALYSIS OF AUTOMOBILE ACCIDENTS TO DETERMINE WHICH VARIABLES ARE MOST STRONGLY ASSOCIATED WITH DRIVER INJURY. RELATIONSHIPS BETWEEN DRIVER INJURY AND VEHICLE MODEL YEAR

North Carolina accident data were analyzed to determine which of a collection of variables characterizing the crash configuration, automobile characteristics, and driver characteristics are most strongly associated with driver injury. In addition, estimates were made of differences in injury rates associated with certain vehicle model year categories from categorical data models developed using the variables selected. Data were placed into two files: one of all data through 1972, the other containing 1973 and 1974 data. The following variables were used: calendar year; driver injury; time of day; road defects; weather conditions; locality; number of violations; type of accident; region of impact; approximate speed before impact; driver age; driver sex; sobriety; mode year; vehicle weight; and seatbelt usage. The 1973/1974 data file also contained a TAD severity rating, which is a pictorial rating scale. The four categories of injury were defined as fatal, A or serious and visible, B or minor and visible, and C or nonvisible (e.g. complaint of pain). The variables selected are all strongly related to driver injury as reflected by the data, and were adjusted for in assessing the effect of model year on driver injury. There was a consistent picture of changes among drivers killed or seriously injured according to model year changes; between 1965 or 1966 and earlier models and the 1967 or 1968 and later models. There was no indication of a true aging effect, in the sense of the vehicle becoming more hostile to its driver. Appended are the Mantel Haenszel procedure, the frequencies, design matrices, and model parameters, the data file format, and accident report forms.

by J. Richard Stewart
University of North Carolina, Hwy. Safety Res. Center,
Chapel Hill, N.C.
1975; 131p 3refs
Supported by the General Accounting Office.
Availability: Corporate author

HS-021 725

DRIVER INJURY IN AUTOMOBILE ACCIDENTS INVOLVING CERTAIN CAR MODELS

Data on injury to unbelted drivers involved in crashes while driving various car makes and models were extracted from a pool of reports on 270,000 vehicles involved in crashes in North Carolina in 1966 and 1968. Driver injury in each car make was compared to driver injury in the aggregate of all vehicles and the comparisons were made on the basis of a set of crash circumstances similar as to speed, impact site, and

accident type. Index scores for many make/year combinations were calculated. It was found that indices ranged among car models from 50 or less (half as frequent injury as in the aggregate) up to 200 or more (twice as frequent injury as in the aggregate). Injury values tended (as would be expected) to be less frequent among heavier cars and more frequent among lighter cars, and to be less frequent among later model cars and more frequent among earlier model cars. In terms of body style, among the standard Chevrolet, Ford, and Plymouth, drivers of station wagons and hardtops were injured significantly less frequently than in the aggregate. There are indications of substantial and statistically significant differences in injury severity among certain American and foreign cars shown in the series. Taking the ones with the highest compared to the ones with the lowest injury frequency, it is seen that the difference exceeds threefold.

by B. J. Campbell
Publ: Journal of Safety Research v2 n4 p207-28 (Dec 1970)
1970; 3refs
A modified version of the full study, Univ. of North Carolina Hwy. Safety Res. Center, 1970, 125p.
Availability: See publication

HS-021 726

WHAT NORTH CAROLINA DRIVERS SUGGEST FOR IMPROVING HIGHWAY SAFETY IN THEIR STATE

An analysis is made of responses to a questionnaire submitted to all applicants at driver license examining stations in North Carolina. Suggestions were invited as to methods of cutting down the death and injury caused by highway accidents. Of 21,680 questionnaires, 25.6% included such suggestions; the applicant's age, sex, education, and whether he had experienced an accident during the previous year influenced his willingness to respond. Nearly half of the respondents mentioned alcohol and the hazard of the drinking driver; almost one third mentioned enforcement. The driver and the road were next most frequently mentioned areas, with administrative/legal, vehicles, signs, signals, and pavement markings, education, and the courts following in that order. Less than 1% mentioned seat belts; even fewer mentioned new modes of transportation. It is clear that in the area of alcohol control there already exists ample concern to support any efforts in regulation.

by Patricia F. Waller
University of North Carolina, Hwy. Safety Res. Center, Chapel Hill, N.C. 27514
1974; 17p
Supported in part by the North Carolina Governor's Hwy. Safety Prog.
Availability: Corporate author

HS-021 727

INTERSOCIETY ENERGY CONVERSION ENGINEERING CONFERENCE (12TH) PROCEEDINGS. VOL. 1

One hundred thirty-five papers are presented in the following categories of the general subject of energy conversion: advanced auto propulsion; alternate fuels; biomedical power; Brayton cycle engines; coal gasification/combined cycles; electric vehicle systems; electrochemistry; energy conservation, including technical problems, industrial systems and equipment, energy storage and thermal energy storage at high temperatures; environmental assessment; fluid bed combustion; geothermal power systems, and hydrogen energy systems. An author index is provided.

American Nuclear Society; Intersociety Energy Conversion Engineering Conference Steering Com.
1977; 1004p refs
Conference held in Washington, D.C., 28 Aug-2 Sep 1977, and sponsored jointly by the American Nuclear Society, the Society of Automotive Engineers, the American Chemical Society, the American Society of Mechanical Engineers, the American Inst. of Aeronautics and Astronautics, the Institute of Electrical and Electronics Engineers, and the American Inst. of Chemical Engineers. Vol. 2 is HS-021 742. Includes HS-021 728--HS-021 741.
Availability: American Nuclear Society, Inc., 555 N. Kensington Ave., LaGrange Park, Ill. 60525

HS-021 728

ALTERNATE FUELS FOR FUTURE AIRCRAFT

The properties and usefulness of synthetic jet fuel, liquid methane, and liquid hydrogen as alternative supersonic and long-range subsonic aircraft fuels are considered. All three can be made from coal, oil shale, tar sands, and various organic wastes. Hydrogen can also be produced directly from water by electrolysis or by thermochemical processes. Use of low-density, cryogenic hydrogen as a fuel in a subsonic aircraft would require a design in which the fuel tanks would be placed both forward and aft of the passenger compartment, occupying the full circular cross section of the fuselage; there would be no access between the flight section and the passenger compartment. Key parameters of such an aircraft and of a synthetic jet-fuel aircraft are tabulated and compared. The liquid hydrogen design has a lower lift/drag ratio in cruise but an overwhelmingly advantageous specific fuel consumption. Hydrogen as a fuel emits no noxious exhaust products other than a small percentage of oxides of nitrogen (NOx); most of the emission is water vapor. As for supersonic aircraft, design plans and advantages are similar to those of the subsonic aircraft. The building and operating of hydrogen-fueled aircraft would be economically feasible if more modern methods of coal gasification and hydrogen liquifaction are employed and if there is a long amortization period for the liquefaction, storage, and handling facilities that would be required. Comparative analyses of liquid methane and liquid hydrogen should continue, so that one may be chosen for future development.

by G. Daniel Brewer
Lockheed-California Co., Burbank, Calif.
Publ: HS-021 727, "Intersociety Energy Conversion Engineering Conference (12th) Proceedings. Vol. 1," LaGrange Park, Ill., 1977 p62-8
Rept. No. SAE-779009; 1977; 10refs
Presented at the Conference, Washington, D.C., 28 Aug-2 Sep 1977.
Availability: In HS-021 727

HS-021 729

THE ZINC-BROMINE BATTERY: POSSIBLE CANDIDATE FOR ELECTRIC VEHICLES AND LOAD LEVELING

The zinc-bromine battery is a fundamentally attractive candidate for electric vehicles and load leveling owing to the use of abundant, low-cost materials, high energy density, good ef-

ficiency, and ambient temperature operation. An approach to zinc-bromine batteries which avoids the traditional shortcomings of rapid self-discharge and short cycle life involves use of an ion exchange membrane, optimized electrolyte composition, and electrolyte circulation. The self-discharge has been decreased to 0.1% per hour, and corresponds to a half-charge retention of 100 to 400 hours. The cycle life is long: at least 2000 2.5-hour cycles at 25 ma/sq cm have been demonstrated. With further development, the system could attain a cost of from $17 to $26 per kilowatt-hour and an energy density of from 60 to 70 watt-hours/kilogram.

by Fritz G. Will
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Publ: HS-021 727, "Intersociety Energy Conversion Engineering Conference (12th) Proceedings. Vol. 1," LaGrange Park, Ill., 1977 p250-5
Rept. No. SAE-779043; 1977; 7refs
Sponsored in part by Energy Res. and Devel. Administration, Div. of Energy Storage Systems. Presented at the Conference, Washington, D.C., 28 Aug-2 Sep 1977.
Availability: In HS-021 727

HS-021 730

THE DESIGN AND DEVELOPMENT OF A 30 KW-HR LITHIUM-ALUMINUM/IRON SULFIDE ELECTRIC VEHICLE BATTERY

Cells of lithium, aluminum, and iron disulfide with molten salt electrolyte are being developed for application in electric vehicle batteries. Each of its prismatic cells consists of one central positive electrode sandwiched between two negative electrodes contained in a cell can which is at negative potential. The positive electrode is split in half by a central sheet in the positive current collector, the plane of the sheet being parallel to the major faces of the electrodes. Improved separators are being developed. Cell design can be optimized for either an upper-plateau or a two-plateau cell; the former is heavier but yields a greater energy output. There are three states of battery development currently in the planning stage: Mark I, scheduled for demonstration in mid 1978, Mark II, scheduled for 1979, and Mark III, scheduled for 1981. The cost of Mark I is estimated to be $2000/kilowatt-hour, with a long-range goal of $35/kilowatt-hour. Behavior and performance of cells in series and parallel arrangements need to be determined, charging strategies need to be developed, the effect of voltage limits needs to be determined, heating and cooling effects during cycling need to be evaluated, and start-up and conditioning strategies for full-scale batteries need to be developed. A six-cell battery is being assembled and tested in an insulated housing; test results are tabulated. Design and development of a 30 kilowatt-hour Mark I battery are proceeding; the battery is diagrammed. Because its operating temperature is 435° C, housing must be developed that will reduce heat loss to the 200 W goal. A vacuum jacket with reflective foil insulation has been proposed as the thermal insulation. A sectional diagram of the battery is presented and its intercell connectors, connections of the copper buss to cell terminals, cell equalization wires, resistive heating elements, and once-through air cooling tub are described.

by W. E. Miller; V. M. Kolba; A. A. Chilenskas; K. Gentry
Argonne National Lab., Chemical Engineering Div., Argonne Ill. 60439
Publ: HS-021 727, "Intersociety Energy Conversion Engineering Conference (12th) Proceedings. Vol. 1," LaGran Park, Ill., 1977 p256-61
Rept. No. SAE-779044; 1977; 5refs
Conducted under the auspices of the Energy Res. and Devel. Administration. Presented at the Conference, Washington, D.C., 28 Aug-2 Sep 1977.
Availability: In HS-021 727

HS-021 731

DESIGN OF A CURRENT TECHNOLOGY ELECTRI VEHICLE

The vehicle design, drive train, and control of a four-p senger electric vehicle for urban use are described. Technol gy available in 1976 was incorporated into the basic desig which meets the safety requirements of the Federal Mot Vehicle Safety Standard. Upgrading technology was identifi by trade-off analysis, and improvements predicted by upgra ing performance with selected, advanced technologies avai ble by mid-1978. The vehicle's general arrangement features front wheelbase which does not protrude into the passeng compartment, 1.02 m headroom, bucket front seats with tegral head restraints, rear seats that face rearward and th fold down, and forward location of the drive components. T battery pack is in a longitudinal tube and centrally located the vehicle; it is carried on a wheeled rack which allo removal from the rear onto a flat platform. The vehicle h crossbar support which connects to the tunnel and overla the door structure; it also serves as a door-hinge mounting a as a reaction member for the side door beam. An additio crossbar member is positioned for the rearward half of t door beam and carries some of the rear suspension loads. T exterior shape of the vehicle was designed for low aerodyna ic drag and good visibility. Side passenger doors open forwa on pairs of hinged links. The rear door is of the gull wing ty with its hinge well forward on the roof. Front suspension is the short-long arm independent type; rear suspension is fu independent. Duo-servo drum brakes were chosen. The ba drive layout consists of longitudinally positioned drive e ments connected to a spiral bevel final drive gear throu transfer cases containing Hy-Vo chains. The lead-acid batte was chosen, along with a current limited, constant voltage, c board charger. The propulsion system involves a tracti motor and the drive train. There is a power conditioning u to match the propulsion motor to the available voltage sour and to control the torque and speed of the propulsion mot Energy consumption at various steady state level vehi speeds is graphed, as is the anticipated range of the Curre Technology Vehicle over a range of steady state level spee and with a 136 kg passenger load. Probable upgradi technologies include regeneration of braking energy into t battery; common power control/battery charger electroni utilizing transistorized power modules; the Improved State-

the-Art (ISOA) lead-acid battery; and optimized controls using microprocessor electronics.

by R. H. Guess; W. R. Nial; M. A. Pocobello
General Electric Co., Schenectady, N.Y.; Triad Services, Inc., Dearborn, Mich.
Publ: HS-021 727, "Intersociety Energy Conversion Engineering Conference (12th) Proceedings. Vol. 1," LaGrange Park, Ill., 1977 p262-8
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HS-021 732

FLYWHEEL MODULE FOR ELECTRIC VEHICLE REGENERATIVE BRAKING

A small, high speed, and lightweight flywheel/a-c synchronous motor alternator, sealed energy storage package has been developed which is coupled to a load commutated inverter power circuit. The system stores sufficient energy in the rotor of the machine for one stop/start cycle. A composite flywheel is used to store additional energy for several cycles, or enough for climbing or descending short grades. The advantages of the system are that it isolates the battery from the accelerating power peaks and recovers a substantial portion of the available braking energy. The system is diagrammed. A solid state power conditioner has been provided to interface with the inductor motor/alternator subsystem and the battery/d-c propulsion motor subsystem; a breadboard of it has been made. Calculations that have been made to date indicate that an energy storage and recovery system should significantly increase the range of a multistop battery electric vehicle such as General Electric's hybrid electric vehicle or the flywheel-powered bus also under development.

by E. L. Lustenader; G. Chang; E. Richter; F. G. Turnbull; J. S. Hickey
General Electric Co., Corporate Res. and Devel., Schenectady, N.Y.; Energy Res. and Devel. Administration, Div. of Energy Storage Systems
Publ: HS-021 727, "Intersociety Energy Conversion Engineering Conference (12th) Proceedings. Vol. 1," LaGrange Park, Ill., 1977 p269-74
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Sponsored by the Energy Res. and Devel. Administration, Div. of Energy Storage Systems. Presented at the Conference, Washington, D.C., 28 Aug-2 Sep 1977.
Availability: In HS-021 727

HS-021 733

COMPARING ALTERNATIVE METHODS OF IMPROVING FUEL ECONOMY

The parameter of vehicle specific fuel consumption (vsfc), suitable for comparing potential fuel economy improvements, is based upon a minimum of empirical data. It is the result of the energy required to accomplish the two standard driving cycles, appropriately weighted, and is calculated as a function of the weight of the vehicle to which the aerodynamic drag and other rolling resistance parameters can be related. The resulting curves are independent of engine type and appear as a family of hyperbolas on a composite mpg, inertia/weight plot. Comparisons of the analytical results with data from the new car fleet of recent model years show a very high degree of correlation. The parameter can be applied to determination of the sensitivity of vehicle fuel economy to potential changes in vehicle weight, improved transmission matching, aerodynamic drag reduction, and reduced accessory loads. Such changes can be expressed as changes in vsfc. Such results can be combined with demographics to estimate fuel savings referenced to the new car fleet.

by Stephen Luchter; Charles J. Daye
Dept. of Transportation; Energy Res. and Devel. Administration
Publ: HS-021 727, "Intersociety Energy Conversion Engineering Conference (12th) Proceedings. Vol. 1," LaGrange Park, Ill., 1977 p2-9
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HS-021 734

THE ERDA AUTOMOTIVE GAS TURBINE PROGRAM

The Chrysler/Energy Res. and Devel. Administration (ERDA) gas turbine program began in 1971 with the sixth generation Chrysler engine as the baseline engine. The first phase of the program, 1971-1976, has developed an engine now under dynamometer test which should match the fuel economy of current, conventional spark ignition engines and also should meet the most stringent fuel emissions standards of the Clean Air Act. It will be tested in the Dodge Aspen. The second phase, 1976-1981, focuses on developing ceramics for hot parts of the engine and on further advancing component efficiencies; industry evaluations should be completed by 1982. The earliest introduction of the engine into the marketplace is not expected until 1982. Initial production with 20%-30% improvement in fuel economy is expected in the 1986-1987 time period. The morphology and classification of automotive Brayton engines are described and diagrammed, as is the baseline Chrysler engine.

by Charles S. Chen
Energy Res. and Devel. Administration, Washington, D.C. 20545
Publ: HS-021 727, "Intersociety Energy Conversion Engineering Conference (12th) Proceedings. Vol. 1," LaGrange Park, Ill., 1977 p10-7
Rept. No. SAE-779002; 1977
Presented at the Conference, Washington, D.C., 28 Aug-2 Sep 1977.
Availability: In HS-021 727

HS-021 735

IMPROVING AUTOMOBILE FUEL ECONOMY WITH ADVANCED TRANSMISSIONS

The fuel economy advantages of the continuously variable transmission (CVT) are presented over other methods of transmission improvement. An historical review of transmissions mentions Levassor's sliding-pinion, change-speed gear; the three-speed sliding gear transmission with direct drive; the four-speed sliding gear transmission; the synchromesh transmission; and the torque converter. Current automatic transmissions have the following components: a three-element torque converter; two Simpson planetary gear sets; friction clutches for automatically changing gear ratios; an oil pump for supplying lubrication and supply pressure for the automatic control system; a hydraulic control system with actuators, servos, and

sensors; and an oil-to-water heat exchanger. The next generation will have torque converter lockup and an overdrive gear ratio, which can improve composite fuel economy up to 15%. The CVT can provide ratio adjustment to permit the prime mover to operate at either peak power for maximum vehicle acceleration or at minimum brake specific fuel consumption (bsfc) for minimum fuel consumption. Automotive applications of the CVT include friction or oil-film drives, hydrokinetic fluid drives, hydrostatic fluid drives, and hydromechanical variable drives; only the first two have advanced into full automotive production. The Energy Res. and Devel. Administration (ERDA) has granted contracts to Ford Motor Co. for development of a traction-type transmission and to Orshansky Transmission Corp. for development of a hydromechanical transmission. In the Ford concept, an oil film is used to transmit torque between a fixed shaft roller and a flexible torus plate; speed ratio variation is accomplished by changing the contact points of the plates around the spherical roller with hydraulically activated pistons. The Orshansky CVT has a split-torque hydromechanical transmission in which the hydraulic path consists of a variable displacement pump and motor and is the variable link which determines the speed ratio at which a simple planetary gear set within the transmission operates. Development of controls and reduction of hydraulic noise are problems.

by Robert Kost; Stephen Luchter
Department of Transportation
Publ: HS-021 727, "Intersociety Energy Conversion Engineering Conference (12th) Proceedings. Vol. 1," LaGrange Park, Ill., 1977 p18-25
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Presented at the Conference, Washington, D.C., 28 Aug-2 Sep 1977.
Availability: In HS-021 727

HS-021 736

CONTINUOUSLY-VARIABLE TRANSMISSION CONCEPTS SUITABLE FOR FLYWHEEL HYBRID AUTOMOBILES

Continuously variable transmission (CVT) concepts for use in a flywheel hybrid automobile include the hydrostatic power-split CVT, the electric power-split transmission, the traction drive, and a multispeed gearbox with a controllable slipping clutch. Since all are reasonable in terms of weight, size, ease of control, and potential cost in production, they must be evaluated in terms of their potential fuel economy in city driving. A set of vehicle parameters was established, against which simulations of the four CVT types were run; parameters and simulation test results are tabulated. Currently available hardware components, if combined in an optimized configuration, can result in a CVT design which would permit an improvement of up to 80% in city fuel mileage. For example, there could be an increase of from 10.2 to about 18 km per liter or of from 24 to 43 mpg for a 1361 kg test vehicle. Results must be accepted as tentative, however, since the computer simulations may not have included all relevant variables and what data were available may not have reflected operating cond tions over the full range of those of the flywheel vehicle.

by Andrew A. Frank; Norman H. Beachley; Richard W. Harter; Alan P. Dietrich; Kam C. Lau
University of Wisconsin-Madison, Coll. of Engineering
Contract DOT-OS-60177
Publ: HS-021 727, "Intersociety Energy Conversion Engineering Conference (12th) Proceedings. Vol. 1," LaGrang Park, Ill., 1977 p26-33
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Presented at the Conference, Washington, D.C., 28 Aug-2 Se 1977.
Availability: In HS-021 727

HS-021 737

COMPUTER PREDICTED COMPRESSION RATIO EFFECTS ON NOX EMISSIONS FROM A METHANOL FUELED SI ENGINE

A combustion kinetics computer model was used to study t compression ratio (CR) effects on performance and emissio of a methanol fueled spark ignition (SI) engine. The SI engi was a comprehensive Otto cycle computer model; the progra was a combination of a chemical equilibrium model to predi the Otto cycle's thermodynamic properties of the gases duri the cycle and a complete chemical kinetics program to predi thermochemical events during the combustion and expansi processes in the SI engine. Earlier experimental work from four-cylinder 2300 cc Ford Pinto engine had shown that vol metric oxides of nitrogen (NOx) emissions decreased wh compression ratio was increased from 9.7:1 to 14:1 at ma imum brake torque (MBT) spark settings. The comput model, however, predicted a continual increase in volumetr NOx emissions for increasing compression ratio at MBT spa timing. With only a 3° retard from MBT, the computer-pr dicted volumetric NOx emissions at 14:1 compression rat were reduced to those at 8.44:1 compression ratio and MB spark timing. With this spark retard setting, there was a net i crease in power and thermal efficiency of 13.7% relative to t MBT values at 8.44:1 compression ratio. Assuming the t dead center (TDC) surface to volume ratio is held constan the cylinder hydrocarbon and aldehyde emissions will not significantly affected by increasing the compression ratio. T high CR will also enhance cold starting. The CR of a methan fueled engine, therefore, should be as high as possible witho introducing autoignition.

by L. H. Browning; R. K. Pefley
University of Santa Clara, Santa Clara, Calif. 95053
Publ: HS-021 727, "Intersociety Energy Conversion Engineering Conference (12th) Proceedings. Vol. 1," LaGran Park, Ill., 1977 p37-43
Rept. No. SAE-779006; 1977; 14refs
Supported by grants from Environmental Protection Agency and Energy Res. and Devel. Administration. Presented at the Conference, Washington, D.C., 28 Aug-2 Sep 1977.
Availability: In HS-021 727

HS-021 738

CASSAVA FUEL ALCOHOL IN BRAZIL

The energetics and economics of ethanol production from ca sava in Brazil are analyzed, including a description of the ca sava-to-alcohol process and comparative net energy rat (NER) analysis of alcohol from cassava versus sugarca

juice. The conversion of cassava starch to alcohol involves saccharification and fermentation. The industrial process involves preparation of the roots into a water-suspension mash; conversion by cooking, liquefaction, and saccharification; fermentation of the sugars to develop a fermented wort having an alcohol concentration of about 8%; then continuous distillation to separate the alcohol from the stillage. Distilleries should use cassava chips which would minimize the effects of the cassava's varying composition during the year. While the sugarcane process has a NER about eight times that of the conventional cassava process, a change from using firewood as fuel to using sun-dried cassava stalks as fuel would result in significant improvement in the cassava-process NER to about five. Under average conditions in Brazil, a typical cassava alcohol distillery producing 150 cu m/day is estimated to cost $16.8 million, compared with $14.6 million for a sugarcane distillery on a similar basis. Cassava alcohol as fuel costs an estimated $1.62/gallon and sugarcane alcohol $1.50/gallon, compared with $1.78/gallon for regular gasoline. The government has fixed the current alcohol price at $1.28/gallon, however, so that both sugarcane and cassava alcohol production costs exceed the set sales price. Molasses alcohol, however, can be produced profitably since it is a byproduct. Technological improvements in the agricultural process such as full mechanization, proper fertilization, and weed control could reduce the cost of cassava alcohol production by about 25%. Other options include combining sugarcane and cassava processing in the same plant.

by V. Yang; W. N. Milfont, Jr.; A. Scigliano; C. O. Massa; S. Sresnewsky; S. C. Trindade
Centro de Tecnologia Promon, Rio de Janeiro, Brazil
Publ: HS-021 727, "Intersociety Energy Conversion Engineering Conference (12th) Proceedings. Vol. 1," LaGrange Park, Ill., 1977 p44-53
Rept. No. SAE-779007; 1977; 10refs
Presented at the Conference, Washington, D.C., 28 Aug-2 Sep 1977.
Availability: In HS-021 727

HS-021 739

EXHAUST AND EVAPORATIVE EMISSIONS FROM A BRAZILIAN CHEVROLET FUELED WITH ETHANOL-GASOLINE BLENDS

Exhaust and evaporative emissions from a 1974 Brazilian Chevrolet Opala were measured using gasoline and the following fuel mixtures: gasoline; 5%, 10%, and 20% ethanol in gasoline; and 5%, 10%, and 20% ethanol in reduced-volatility gasoline. The vehicle was designed to operate with rich air/fuel mixtures. Addition of up to 20% ethanol to the gasoline reduced exhaust hydrocarbon and carbon monoxide emissions, but increased exhaust aldehyde and nitrogen oxide emissions. The leaning of the air/fuel mixture, due to ethanol addition, was the primary cause of the exhaust emission changes. Evaporative emissions were slightly higher with 10% ethanol in gasoline than with gasoline alone. Future automobiles in Brazil will require a fuel with constant ethanol content unless a vehicle system can be developed to compensate for variable ethanol contents in fuel. Appended are a tabulation of the properties of the fuel mixtures tested and a detailed description of the evaporative emission test technique (SHED technique) used in the study.

by Robert L. Furey; Marvin W. Jackson
General Motors Corp., Warren, Mich.
Publ: HS-021 727, "Intersociety Energy Conversion Engineering Conference (12th) Proceedings. Vol. 1," LaGrange Park, Ill., 1977 p54-61
Rept. No. SAE-779008; 1977; 18refs
Presented at the Conference, Washington, D.C., 28 Aug-2 Sep 1977.
Availability: In HS-021 727

HS-021 740

AVOIDING ENERGY CATASTROPHY WITH EVOLUTIONARY ALTERNATE FUELS DERIVED VIA SYSTEMS TECHNOLOGY

A systems-oriented fuel technology urgently needs to be developed and applied to the U.S. need for natural gas and petroleum substitutes. The immense and diversified markets and applications of fuels will require tremendous activities for even modest changes. Resources and products are likely to coexist in amounts and combinations not readily predictable; it probably will be necessary to develop and use a continuum of fuel compositions that offer maximum use of available petroleum and alternative resources in an efficient, economical manner. A systems technology will have to match the available resources, processes, and combustors; satisfy market supply and demand; minimize adverse socioeconomic impacts and accentuate favorable ones; fully utilize available products in an energy-efficient manner; and move toward optimum use of new resources. Coal and oil shale are the only currently available domestic resources sufficient to replace petroleum for transportation use; the process technology to do so is complex, however. Other sources of fuels specifically for highway vehicles include synthetic fuels (synfuels), alcohols, and hydrogen. Alcohols, including methanol from coal and ethanol from biomass, may be used as petroleum extenders by blending them with gasoline. Engine technology will have to take into consideration the adaptability to a variety of fuel types. The systems technology approach requires teamwork among the process, fuels, and engine designers and planners.

by E. Eugene Ecklund
Energy Res. and Devel. Administration
Publ: HS-021 727, "Intersociety Energy Conversion Engineering Conference (12th) Proceedings. Vol. 1," LaGrange Park, Ill., 1977 p69-77
Rept. No. SAE-779010; 1977; 18refs
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Availability: In HS-021 727

HS-021 741

THE PROSPECTS FOR FUELS FROM BIOMASS

An example of biomass or biological renewable resources as fuel sources is sugarcane, the readily fermented carbohydrates of which could be used for ethanol production. Blends of gasoline and ethanol derived from sugarcane might be suitable for production in the Commonwealth of Puerto Rico, Hawaii, Louisiana, and Florida. At greatest hypothetical future production, only 3%-4% of present motor fuel needs would be met. Production costs are estimated on the basis of harvesting the entire aerial portion of the plant and planting with 0.6 meter

between plants instead of 1.5 to 1.8 meters apart. A large facility for manufacturing the ethanol might require a capital investment of approximately $127 million. The cost of anhydrous ethanol is about 31 cents per liter; the price of fermentable sugars is a vital factor: only if fermentable sugars were cost-free would the cost of ethanol be approximately equal to the present cost of gasoline. Energy analysis of biomass must consider the quality and quantity of the energy inputs and outputs of the entire system. There is a small but perceptible energy gain in the production of ethanol from biomass in contrast to the manufacture of ethanol from nonrenewable sources, since the latter leads inevitably to a greater loss of energy than that represented by the ethanol product. A fuel mixture of 90% gasoline and 10% ethanol might cost two cents per liter more than regular gasoline at the pump. The state of the art of developing fuels from biomass is primitive. Alternative uses of biomass such as for chemical feedstocks, papermaking pulp, and human or animal food are currently more appropriate. It will probably take future nonavailability of petroleum-based fuel to motivate production of fuel from biomass.

by Edward S. Lipinsky
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Publ: HS-021 727, "Intersociety Energy Conversion Engineering Conference (12th) Proceedings. Vol. 1," LaGrange Park, Ill., 1977 p94-9
Rept. No. SAE-779015; 1977; 9refs
Supported by Energy Res. and Devel. Administration, Fuels from Biomass Prog. Presented at the Conference, Washington, D.C., 28 Aug-2 Sep 1977.
Availability: In HS-021 727

HS-021 742

INTERSOCIETY ENERGY CONVERSION ENGINEERING CONFERENCE (12TH) PROCEEDINGS. VOL. 2

One hundred papers are presented in the following categories of the general subject of energy conservation: magnetohydrodynamics; nuclear power, including power plants, fuel cycle, and advanced reactors; Rankine cycle engines; solar concentration systems, storage, thermal power, heating and cooling, and total solar energy systems; space power, including thermoelectrics, space power systems, and satellite power systems; Stirling cycle engines; thermionics; and wind turbine technology. A section of abstracts of papers presented in the 1974, 1975, 1976, and 1977 sessions is included, with an author and subject index that includes the 1973 papers as well.

American Nuclear Society; Intersociety Energy Conversion Engineering Conference Steering Com.
1977; 992p refs
Conference held in Washington, D.C., 28 Aug-2 Sep 1977, and sponsored jointly by the American Nuclear Society, the Society of Automotive Engineers, the American Chemical Society, the American Society of Mechanical Engineers, the American Inst. of Aeronautics and Astronautics, the Institute of Electrical and Electronics Engineers, and the American Inst. of Chemical Engineers. Vol. 1 is HS-021 727.
Availability: American Nuclear Society, Inc., 555 N. Kensington Ave., LaGrange Park, Ill. 60525

HS-021 743

DIESEL-ORGANIC RANKINE COMPOUND ENGINE DEVELOPMENT

A completely integrated diesel-organic Rankine compound engine for long-haul trucks has been designed, built, and is currently under test. The system improves the fuel economy of this class of truck by 15%, implying a national fuel savings of 1.8 billion gallons at projected consumption levels. The prototype compound engine was built around a standard Mack truck diesel engine, model END-T676, installed on a dynamometer. The exhaust waste-heat recovery system is an organic Rankine-cycle engine incorporating a turbine expander delivering power directly to the diesel engine drive train. Details of the turbine, gearbox, coupling of gearbox to engine PTO, controls, feedpump, vapor generator, radiator, condenser, regenerator, condenser-radiator fan, and fan drive are given. Because the system can be installed with existing hardware, it would be economically feasible to mass produce it.

by E. Doyle; S. Helekar; R. Raymond
Thermo Electron Corp., Waltham, Mass.
Publ: HS-021 742, "Intersociety Energy Conversion Engineering Conference (12th) Proceedings. Vol. 2," LaGrange Park, Ill., 1977 p1073-9
Rept. No. SAE-779170; 1977; 5refs
Presented at the Conference, Washington, D.C., 28 Aug-2 Sep 1977. Supported by Energy Res. and Devel. Administration, Transportation Energy Conservation.
Availability: In HS-021 742

HS-021 744

OFFICERS' MANUAL ON THE DETECTION, APPREHENSION AND PROCESSING OF PERSONS IMPAIRED BY ALCOHOL. REVISION NO. 3

The manual is a reference document for use by Vermont law enforcement officers as they detect, apprehend, and process persons operating motor vehicles while under the influence of intoxicating liquors (DWI). The chapters include the following: alcohol abuse in our society; Vermont's DWI law; DWI detection and apprehension; DWI processing, including suggestions for handling the driver and for filling out the forms; and the effects of alcohol consumption. Other chapters concern types of drinkers, false statements about alcoholism, and sources of help for persons having drinking problems. Finally, chapters are provided which deal with procedures for using a tape recorder and for handling a crimper when gathering breath samples.

Project CRASH, P.O. Box 535, Waterbury, Vt. 05676
(n.d.); 101p
Prepared under DOT contract, and in cooperation with Vermont State's Attorney Assoc., Vermont Dept. of Public Safety, and Chiefs of Police Assoc. of Vermont.
Availability: Reference copy only

HS-021 745

PROJECT CRASH [COUNTERMEASURES RELATED TO ALCOHOL AND SAFETY ON THE HIGHWAYS] SCHOOL MANUAL. [DRUNK DRIVER IMPROVEMENT]

The manual is designed for use in the (CRASH) school for those who have been convicted as drinker drivers. The materi-

al is arranged in four class sessions; the course involves attendance at all classes, preparation of class assignments, passing of tests and a final examination, and attendance at small group sessions. The first class deals with the reasons for attendance, Vermont's laws about driving while intoxicated (DWI), the seriousness of the alcohol and driving problem, how alcohol affects driving skills, case studies of persons killed in alcohol-related motor vehicle crashes, and a homework assignment to keep daily record of how much the individual drinks. The second class concerns the difference between being impaired by alcohol and being drunk, alcohol tolerance, amounts of alcohol in various beverages, physiology and psychology of alcohol impairment, effects of alcohol impairment on driving, and establishing safe drinking and driver levels. Class assignment concerns computing the individual's blood alcohol concentration when drinking (BAC) and those of drinking friends. The third class defines what is problem drinking, considers individual drinking behavior, discusses the myths about drinking and alcohol, and consideration of alcoholism as a disease. Class assignment involves attempting to restrict or stop drinking for given periods of time. The final class deals with analyzing the reasons why the individual drinks, learning what safe drinking limits are, reviewing effective ways to limit drinking, and learning about programs and organizations which can help the individual with drinking problems.

Project CRASH, P.O. Box 535, Waterbury, Vt. 05676
(n.d.); 115p
Availability: Reference copy only

HS-021 746

VASAP [VIRGINIA ALCOHOL SAFETY ACTION PROGRAM] ANNUAL REPORT FOR CALENDAR YEAR 1975

Virginia Alcohol Safety Action Programs (VASAP's) are currently in progress in Fairfax, Arlington, Portsmouth/Suffolk, and the Peninsula. Other areas are in a planning phase. In 1974, Fairfax ASAP reported a significant reduction of 1546 crashes and 66 lives saved over 1972 figures. Based on societal costs of crashes versus program costs for this period, Fairfax showed an $11.79 savings for each dollar invested in the program. The arrest rate has increased twentyfold in Fairfax and doubled in Arlington, site of the second oldest VASAP. Seminars and workshops have been held in all areas of the state interested in the program. Six public forums have been held. These meetings have included community leaders needed to get a program underway. A probation and parole conference was held to acquaint parole officials with VASAP operations. A statewide orientation program helped local offices discuss progress and exchange information. Six judicial conferences will be conducted during the first six months of 1976. These conferences will provide the Division with vital feedback from district court judges. Policy memorandums issued by the Division cover the following subjects: description of planning necessary for a VASAP; preparing the organizational plan and budget for an operational VASAP; financial - planning and operational; and intake, classification, and probation.

Virginia Alcohol Safety Action Prog., Hwy. Safety Div. of Virginia
Rept. No. VASAP-Annual-Report-1975; 1976?; 27p
Availability: Reference copy only

HS-021 747

AN ANALYSIS OF THE IMPACT OF ASAP ON THE TRAFFIC SAFETY SYSTEM IN FAIRFAX COUNTY: 1975. FINAL REPORT

Utilization by the courts of the rehabilitation facility available in the Alcohol Safety Action Proj. (ASAP) is described, comparative information is presented on the disposition of driving while intoxicated (DWI) arrests by the courts for the 1972-1975 period and prior years, and the magnitude of time delays encountered in the judicial countermeasure activities in processing the DWI offender is examined. Until 1975, the rate of referral to ASAP was about 80% of DWI cases. During 1975, however, the average rate dropped to 54% for the entire year, due to congestion of cases being processed in the Probation Office. Further referral to ASAP was drastically curtailed until such time as a maximum of two weeks would be needed for actual intake into ASAP after initial court appearance. Amount of fines rose from the typical $50 of 1972 to an average closer to $100 in subsequent years. In addition, 1974 and 1975 DWI offenders also received more license suspensions. Average elapsed time from arrest to arraignment was slightly over one month with little variation over the four ASAP years. Time from arrest to treatment completion seems to have become longer over the years. Time from arrest to final court appearance was reduced from about seven months prior to 1975 to about six months in 1975, due to a change in the judicial procedure whereby final appearances were held before treatment was completed. As for the influence of the judicial system on other aspects of ASAP, there has been support for the continued high DWI arrest rate. Appended are samples of client information sheets and active client status reports.

by Edward R. Sweeton
Alcohol Safety Action Proj., Fairfax County, Va.; Center for the Environment and Man, Inc., 275 Windsor St., Hartford, Conn. 06120
Rept. No. CEM-4104-551; Fairfax:ASAP-Analytical-Study-4; 1976; 43p 4refs
Subcontracted to Center for the Environment and Man, Inc.
See also HS-021 748.
Availability: Reference copy only

HS-021 748

AN ANALYSIS OF THE IMPACT OF ASAP ON THE TRAFFIC SAFETY SYSTEM IN FAIRFAX COUNTY: 1974. FINAL REPORT

Comparative information was gathered on the disposition of alcohol-related arrests by the courts in Fairfax County, Va., for the 1972-1974 Alcohol Safety Action Proj. (ASAP) period and for prior years, the disposition groups were profiled, and the magnitude of time delays encountered in the judicial aspect of ASAP in processing offenders was examined. The profile of the driving while intoxicated (DWI) offender includes the following points: 93% are male; 54% are under age 35, and 77% are under age 45; blood alcohol concentrations (BAC's) tended to be over .15; 55% had incurred one or more traffic offenses during the preceding three-year period; and only 5% had at least one prior alcohol-related offense on their three-year record. In comparison with profiles of an earlier group of offenders, there was a striking reduction in the percentage of those who had prior DWI records. There was shown to be a trend towards younger offenders and towards slightly lower BAC's. Study of the court dispositions of the

DWI offenders showed that 1972 offenders received higher initial sentences which for the most part were all or partially suspended. The 1973 and 1974 DWI offenders received initial fines which reflected more the final fines, and were higher. Also, 1974 offenders received more license suspensions and were put on probation more often. Average elapsed times from arrest to arraignment and from arrest to final court appearance were slightly higher in 1974 after a slight drop in 1973. This was probably due to a significant increase in time spent in rehabilitation programs in 1974 per DWI defendant. A similar increase in final disposition was avoided by a change in judicial procedure during the year whereby the final court appearance was held before the treatment was completed. As for the influence of the judicial system on other programs of ASAP, there has been support for the continued high DWI arrest rate. Appended are the court sanctions imposed by ASAP and regular patrols, and a sample of data information sources.

by Edward R. Sweeton; Kayla C. Costenoble
Alcohol Safety Action Proj., Fairfax County, Va.; Center for the Environment and Man, Inc., 275 Windsor St., Hartford, Conn. 06120
Rept. No. CEM-4101-538; Fairfax:ASAP-Analytical-Study-4; 1975; 35p 4refs
Subcontracted to Center for the Environment and Man, Inc.
See also HS-021 747.
Availability: Reference copy only

HS-021 749

VERMONT ASAP [ALCOHOL SAFETY ACTION PROJECT] ANNUAL REPORT, 1973. [APPENDIX H, TABLES]

Statistical data are tabulated on a quarterly basis for the following aspects of the Vermont Alcohol Safety Action Proj. (ASAP): financial and personnel; household surveys of total project impact; fatal single-vehicle, multivehicle, and pedestrian crashes; injury single-vehicle, multivehicle, and pedestrian crashes; fatal and injury crashes according to day of week and time of day; blood alcohol concentration (BAC) data for drivers killed or arrested; patrol activity; disposition of alcohol-related traffic arrests; background investigation activity; medical/psychological diagnosis and review activity; driver license record review; rehabilitation program status report; and public information and education activity.

Vermont Alcohol Safety Action Proj.
Rept. No. Vt:ASAP-Annual-Report-1975-App-H; 1974?; 108p
Availability: Reference copy only

HS-021 750

SELECTING POWERTRAIN COMPONENTS FOR HEAVY DUTY TRUCKS

The Vehicle Mission Simulation model drives the truck over the trucker's routes and provides performance data of over-the-road performance by which the trucker can evaluate the suitability of the particular truck's powertrain components. The time-based simulation model makes a series of calculations within many small time increments, in the following closed-loop order: start vehicle from stop; select time increment; calculate grade resistance; calculate rolling resistance; calculate wind resistance; determine throttle or brake position; look up fuel rate; calculate vehicle velocity; adjust desired vehicle speed; record operating data; record idle time; and then, either select gear or start vehicle from stop again. An example of the model simulation is given using a run of 13 diesel engines hauled in 1974 conventional line haul trailers having tandem axles with both axles driving, a 240 hp nonturbocharged diesel engine, and a cab-mounted wind deflector, in comparison with the same cargo run made by two new trucks using high torque rise engines rated at 1900 rpm, with turbocharged diesel engines, and 230 and 270 hp respectively. Comparison of the simulation results shows the advantages of the new trucks in average speed, fuel consumption, engine load factor, gearshifting, starting on grade, and top speed. Appended are a discussion of truck components and environmental factors and the formulas for truck power requirements.

by Donald A. Klokkenga
Cummins Engine Co., Inc.
Rept. No. SAE-760830; 1976; 15p 5refs
Presented at Truck Meeting, Indianapolis, Ind., 1-4 Nov 1976.
Availability: SAE

HS-021 751

PAPER TRUCKS ON PAPER ROADS

Computer simulation of the behavior of a diesel engine is based on the Detroit Diesel 6V-92TT two-cycle diesel engine. The principles also apply to the four-cycle diesel. The simulation approach involved computation of vehicle power requirements in incremental steps along a defined route involving grades, speed limits, and special conditions, against limits of engine horsepower, engine speed, route conditions, and a set of rules defining driver behavior. Establishing the basic engine for the simulation takes into consideration the effect of axle ratio on fuel economy, the governor droop line, and nonstandard conditions of the ambient air. Engine inertia is a desirable factor to consider in simulation, but it can be avoided by using a program having only highway routes in which use of first and second gears is minimal. Engine friction is the power required to motor the engine without fuel input, and is estimated by straight line extension of fuel flow curves to the zero fuel flow point. Simulation of engine throttle response is important when standing start accelerations are considered; a very simple clutch model can be used. As for engine accessories, a temperature-controlled fan should be taken as disengaged at all times; other accessories such as air compressors and alternators generally should be taken at their no-load horsepower.

by M. D. Barta
General Motors Corp., Detroit Diesel Allison Div.
Rept. No. SAE-760831; 1976; 10p
Presented at Truck Meeting, Indianapolis, Ind., 1-4 Nov 1976.
Availability: SAE

HS-021 752

WIND TUNNEL INVESTIGATION OF THE EFFECTS OF INSTALLATION PARAMETERS ON TRUCK COOLING SYSTEM PERFORMANCE

The effects of installation and component parameters on cooling system heat rejection and air flow were examined in detail in a wind tunnel facility. The parameters included the following: fan/radiator distance; fan/engine block distance; fan tip/shroud clearance; projection of fan into shroud; type of shroud; and direction of air flow or blower fan versus suction fan. A quarter-replicate, two-level factorial test plan was fol-

highly significant parameters. The fan/radiator distance, the radiator characteristics, and the fan tip/shroud clearance are significant parameters. The fan/engine block distance and the type of shroud are not significant parameters. Heat rejection capability of the cooling system is best increased by maximum fan speed and size allowable by noise consideration, fan horsepower, and physical space. The type of shroud used is not important, but it should have the tightest tip/shroud clearance possible. Maximum space between the fan and the radiator should be used.

by D. O. Taylor; A. C. Chu
Cummins Engine Co., Inc.
Rept. No. SAE-760832; 1976; 16p 14refs
Presented at Truck Meeting, Indianapolis, Ind., 1-4 Nov 1976.
Availability: SAE

HS-021 753

DIAGNOSTICS OF DIESEL ENGINES USING EXHAUST SMOKE AND TEMPERATURE

An experimental sensor array has been designed, built, and tested; it instantaneously measures dynamic exhaust temperature and dynamic smoke to diagnose diesel engine fuel injection equipment. It is portable, easily installed on truck tailpipes, and is capable of measuring changes in gas temperature over 104° F/second. Data are electronically filtered and then time averaged over many cycles. Fuel injection faults resulting in a power loss of 5% or more are consistently detected and isolated to a cylinder location. The cause cannot be consistently de ermined. The sensor array was tested using two 6V-53 Detroit Diesel engines. The dynamic smokemeter is an optical device which measures very low levels of light opacity in the smoke plume, with a response compatible with the engine firing frequency. Dynamic exhaust temperature data had more diagnostic significance than dynamic smoke in the detection of maximum power degrading fuel injection faults. Gaseous exhaust emissions including carbon monoxide, carbon dioxide, ozone, and oxides of nitrogen, and hydrocarbons were also evaluated for their diagnostic merit. They were found to be less significant than the dynamic temperature and smoke data under the no-load test constraints common to shop and field diagnosis.

by Robert N. Hambright; H. S. Benson
Southwest Res. Inst.
Rept. No. SAE-760833; 1976; 11p 7refs
Presented at Truck Meeting, Indianapolis, Ind., 1-4 Nov 1976.
Supported in part by the U.S. Army Tank-Automotive Command.
Availability: SAE

HS-802 110

AN ACTIVIST'S GUIDE FOR CURBING THE DRUNK DRIVER

A booklet designed for public education is intended to help the individual deal with the drunk driving problem on a personal level, among family and friends, by outlining specific steps for keeping people who plan to drive from becoming intoxicated, for keeping people who have had too much to drink off the road, and for promoting a more mature and more responsible attitude toward drinking and driving on the part of everyone in sober friend must take charge of the situation. Parents must communicate with their children, sharing feelings and attitudes towards drunk driving; use of the buddy system among teenagers should be suggested. The individual should protest to the media over displays of drinking and driving as socially acceptable behavior. The employer should use his or her position of authority and respect to condemn drunk driving, and to support safe driving habits. The employee should support safe driving programs of his or her employer. The police officer, judge, lawyer, physician, pharmacist, and school teacher or administrator have particularly important responsibilities in curbing drinking, drunk driving, and use of alcohol with certain prescription drugs. The host or hostess should not force alcoholic drinks on the guests, and should close the bar about an hour before the party ends; the guests should agree on who is driving home, so that that person can keep alcohol consumption to a minimum.

National Hwy. Traffic Safety Administration, Washington, D.C. 20590
1977; 23p
Availability: Corporate author

HS-802 413

MANUAL BRAKE INSPECTION PROCEDURES. VOL. 1. SUMMARY REPORT. FINAL REPORT

Performance and nonperformance brake inspection was investigated with the object of replacing the current method for performing these inspections with less expensive ways, more suitable for small garages. The performance part of the program culminated in the construction of a torsion bar dynamometer that can meet all legislated requirements for vehicles in use performance inspections, previously only possible on machines of more costly design. The nonperformance investigation resulted in the identification of recommended nonperformance inspection items.

by T. H. Forman; M. Finigian
Avco Systems Div., 201 Lowell St., Wilmington, Mass. 01887
Contract DOT-HS-5-01188
Rept. No. AVSD-0373-76-RR; 1977; 34p
Rept. for Jun 1975-Dec 1976.
Availability: NTIS

HS-802 501

(6TH) INTERNATIONAL TECHNICAL CONFERENCE ON EXPERIMENTAL SAFETY VEHICLES

Ten government status reports were presented from the United Kingdom, Italy, France, Federal Republic of Germany, the European Experimental Vehicles Com., a working group on biomechanics, Japan, and the U.S. Twelve industry status reports were presented by Calspan/Chrysler Research Safety Vehicle group, Minicars Research Safety Vehicle group, the Japanese automotive industry, Alfa Romeo, Fiat, Pininfarina Wind Tunnel work in Turin (Italy), the German automotive industry, Volkswagen and the Research Safety Vehicle, Citroen, Peugeot, and Renault. Technical seminars were held on vehicle structural properties and occupant protection, accident analysis, accident avoidance, and biomechanics, pedestrian impact, and dummies. There were 49 seminar papers in all. Nine papers were presented on future vehicle safety and develop-

ment. Transcripts are given for introductory remarks, keynote address, and closing remarks; participants are listed.

National Hwy. Traffic Safety Administration
1976?; 831p refs
Conference held in Washington, D.C., 12-15 Oct 1976.
Includes HS-021 650--HS-021 662, HS-021 647 and HS-021 648, HS-019 524, HS-019 550--HS-019 556, HS-019 559--HS-019 561, HS-019 563--HS-019 570, HS-019 572, HS-019 574--HS-019 576, HS-019 578--HS-019 581, HS-019 586--HS-019 592, HS-019 594--HS-019 597, HS-019 599--HS-019 603.
Availability: Corporate author

HS-802 537

GLOSSARY OF TERMS FOR USE IN PUBLICATIONS OF TRAFFIC SAFETY PROGRAMS

Approximately 400 single-word and multi-word terms commonly found in traffic safety publications are arranged alphabetically and defined. Multiple definitions are given where appropriate to reflect current usage. Included are a number of statistical terms.

National Hwy. Traffic Safety Administration, Traffic Safety Programs, Washington, D.C. 20590
1977; 38p
Availability: NHTSA

HS-802 590

55 MPH FACT BOOK. 1976 EDITION

The origin of the 55 mph speed limit, its relationship to highway safety, response of the public, and data on its enforcement are presented. The legislation on which the speed limit is based was the Emergency Highway Energy Conservation Act, signed 2 Jan 1974, which prohibited the U.S. Secretary of Transportation from approving Federal-aid highway projects in any state having a maximum speed limit in excess of 55 mph. The measure was intended to conserve fuel but has been retained because of its significant beneficial impact on highway safety. Tabulated data presented include traffic fatalities by state for the individual years 1972 through 1976, and motor vehicle traffic fatality rates for the same years, by state. Raising the speed limit to 60 mph would cause most safety benefits to be lost, since it would result in more variation in speed among vehicles on a given highway, and would void the drop in deaths occurring on rural primary and secondary roads. Public opinion surveys show that the majority favors the 55 mph speed limit. Questions commonly asked include the following: is there really an energy crisis, and is the speed limit really helping; does the speed limit really increase safety; are trucks more efficient at higher speeds, and why do trucks and buses seem to break the speed limit law; and if the law is unpopular, why isn't it changed. As for enforcement, about half of all drivers are still violating the 55 mph speed limit. Each state must provide documentation to the Secretary of Transportation concerning enforcement. Enforcement techniques vary from area to area. Data are presented on percent of vehicles exceeding the 55 mph limit and the 65 mph limit, by state and year (1975-1977), annual arrest data by state enforcement agencies for 1973-1976, and average speed and 85th percentile speed by state for 1975-1977. Appended data include the following: vehicle traffic fatalities by state of occurrence in 1976 and percent change from 1975; motor vehicle traffic death rate in 1976 and percent change from 1975; basic statistics about motor vehicle deaths in the U.S., 1950-1976; basic data on motor vehicle accidents in the U.S., 1936-1976; and traffic fatalities, fatality rates, drivers, vehicles, and vehicle miles of travel, 1961-1976. Also appended are a study of the effect of the 55 mph speed limit law on fatal crashes in Texas, and a copy of the Title 23, Part 658 law concerning certification of speed limit enforcement.

National Hwy. Traffic Safety Administration, Office of Driver and Pedestrian Programs, Washington, D.C. 20590
1977; 36p 36refs
Availability: Corporate author

HS-802 594

HIGHWAY SAFETY PROGRAMS EFFECTIVENESS MODEL. FINAL TECHNICAL REPORT

A model was constructed which is capable of functionally relating highway safety program outputs of the National Hwy. Traffic Safety Administration to risk factors and then to accidents, injuries, and fatalities. The model inputs and outputs were obtained from a conceptual Causal Network which displayed the factors believed to influence the occurrence of an accident and their postulated interdependencies in leading to an accident. Also depicted in the network were the outputs of the highway safety activities as they were believed to interact with the intervening factors. The models constructed were each (nonlinear) polynomial functions known as Adaptive Learning Networks (ALNs). The ALN methodology was applied to the factors set forth in a Causal Network constructed especially for this project. The relationships between the program outputs, the intervening factors, and the occurrence of accidents displayed in the network were tested along with various other variable combinations utilizing nationally representative data. The postulated network was checked and appropriately altered so as to trace quantitatively the effects of the outputs of highway safety programs in deterring accidents through the control of the intervening factors. This deterrent effect was estimated by asympotically reducing the outputs of the highway safety programs to zero and observing the impact of these reductions on the intervening factors, and in turn, the effect of these alterations in the intervening factors on accident occurrences. The major results of this study were the following. Nonlinear, multivariate models possessing good accuracy have been synthesized for the intermediate risk factors using accident data collected in the State of Indiana. The conjectured Causal Network was restructured by examination of which network variables were determined by the models to influence maximally a given risk factor. The effect of a particular exogenous variable -- driver age -- on intermediate risk factors was established quantitatively and it was shown how this information could be used to evaluate highway safety program outputs that might influence such variables. The influence of driver age was found to vary from small to considerable in predicting several highway risk factors. Appended are the characteristics of the Indiana Tri-Level Accident Data Base, diagrams of restructured causal networks, and descriptions of statistical modeling techniques.

by Anthony N. Mucciardi; Elsie C. Orr; Jian K. Chang
Adaptronics, Inc., Westgate Res. Park, 7700 Old Springhouse Rd., McLean, Va. 22101
Contract DOT-HS-6-01496
1977; 109p 10refs
Rept. for Sep 1976-Jul 1977.
Availability: NTIS

HS-802 610

ANALYSIS OF ANGULAR MISALIGNMENT ERRORS IN MOUNTING LINEAR ACCELEROMETERS TO ANATOMICAL SUBJECTS. TECHNICAL REPORT

Mathematical analyses of linear accelerometers mounted on such anatomical subjects as cadavers and primates show that the accuracy of the measurements depends on the accuracy by which the linear accelerometers, especially when used as single elements, are aligned angularly during mounting relative to a suitable anatomical reference frame. Often an anatomical reference frame is not well defined, making accurate angular alignment difficult. The three analyses described concern a linear accelerometer used as a single element, a triaxial combination of three linear accelerometers, and a biaxial combination. When linear accelerometers are used as single elements they measure only an apparent acceleration of an acceleration component. Measurements of apparent acceleration are subject to corresponding random errors; perpendicular components of acceleration should be minimized. If the random angular misalignment has a standard deviation of three degrees, then the length of the 95% confidence interval is 20% of the absolute value of the sideways acceleration. If the sideways acceleration were 50 g, the confidence interval would be 10 g. When three linear accelerometers are used in a triaxial configuration, each measures an apparent acceleration from which equations for individual acceleration components can be derived. There is a 95% confidence interval of 10 g. The advantage of a triaxial configuration is that the magnitude of the resultant acceleration computed from the measurements of the three separate components is approximately independent of misalignment errors when mounting a triaxial configuration to an anatomical subject. The biaxial configuration has features similar to that of the triaxial configuration, but its application is limited to cases of planar acceleration. Future research should extend the analyses to higher order approximations, should measure the size of the possible angular misalignment errors, and should consider applicability of results to other measurement devices.

by Arnold K. Johnson
National Hwy. Traffic Safety Administration, Washington, D.C. 20590
1977; 53p 11refs
Availability: NTIS

HS-802 733

ATTITUDINAL AND BEHAVIORAL CHANGES OF ALCOHOL IMPAIRED DRIVERS AND ANALYTICAL STUDY OF THE ALCOHOL EDUCATION PROGRAM OF THE BOSTON ALCOHOL SAFETY ACTION PROJECT

The Alcohol Reeducation Prog. of the Boston, Mass., Alcohol Safety Action Proj. (ASAP) consists of seven biweekly, two-hour sessions taught by both recovering alcoholics and nonalcoholics following an outline curriculum guide. The program is process oriented, emphasizing peer interaction and individual participation; any information volunteered by the students is kept confidential. Classes are kept small, are held in physically attractive, comfortable, and convenient surroundings, and in an objective, nonjudgmental, and supportive atmosphere. The first session is designed to give the student a receptive attitude towards the program, the second deals with alcohol as a drug, the third concerns use and abuse of alcohol in our culture, and the fourth considers the symptoms of alcohol abuse. The fifth session deals with the student's own drinking habits, the sixth concerns the drinker in relation to society, and the seventh is an evaluation session in which the student evaluates his own attitudes and the program itself, and the teacher evaluates the student and plans further rehabilitation if appropriate. A film is shown at each session. Evaluation of effectiveness using the Marcus Alcoholism Questionnaire showed that there was significant improvement in attitudes toward the use of alcohol, in comparison with a control group in which no change in attitude was noted. The majority of students were white males with a mean age of 32 years.

by Lewis B. Sheen; Velandy Manohar; Lavinia Destefano
Boston Alcohol Safety Action Proj., 211 Congress St., Boston, Mass. 02110
Contract DOT-HS-075-1-098
Rept. No. Analytical-Study-5; Analytical-Study-6; 1975?; 39p 16refs
See also HS-021 643 and HS-021 645.
Availability: Reference copy only

HS-802 734

DRINKING AND DRIVING PRACTICES OF BOSTON RESIDENTS, 1971. A HOUSEHOLD SURVEY. RESEARCH REPORT

A household survey was made of residents age 16 and over of Boston, Mass., to determine knowledge and attitudes toward alcohol and traffic safety and to ascertain their drinking and driving behavior. The survey, conducted Dec 1971-Jan 1972 prior to establishment of the Boston Alcohol Safety Action Proj. (ASAP), was intended as a base against which a later survey would measure changes that might be due to ASAP's public information and education efforts. Items were placed into the following six categories: traffic accidents and drinking drivers; knowledge of the law and alcohol usage; knowledge and attitudes; driving habits; drinking patterns; and alcohol and traffic safety. Boston residents did not appear to be highly knowledgeable of traffic safety findings as currently disseminated. More than half the respondents had a good grasp of the state penalty for driving under the influence of liquor (DUIL) and felt it was fair. Although over half knew the meaning of blood alcohol level (BAC), only a very small fraction knew what the legal minimum BAC level is for being considered drunk. Only one third knew of any program such as ASAP; many were not aware how alcohol functions in the body. From 70% to 89% favored the adoption of police enforcement, severe penalties, public information, education, improved treatment services, and road checks, but only 35% favored Antabuse programs. Of the sample, 55% were drivers, twice as many people under age 30 drove than those over that age, and significantly more heavy and moderate drinkers drove than did light drinkers or abstainers. Of the sample, 84% were drinkers, only 1% of which admitted to being heavy drinkers. As for the amount of alcohol one would drink and then drive, 20% of drinking drivers said they would have three or less drinks and 12% would have four or more drinks; of that 12%, males outnumbered females ten to one. Of heavy drinkers, 45% were escapists; heavy drinking is directly related to personal or work problems. There is a need for a vigorous public information and educational program for the following types of individuals: those not knowledgeable of traffic safety findings; those ignorant of the drinking/driving law; heavy drinkers, males, and persons under 30 years of age; and those who do not know the minimum BAC for being legally drunk. There is a high incidence of drinking in Boston in comparison

with the rest of the nation, and the city's potential alcohol-related traffic accident problem is great. Appended are the survey questionnaire, organization of its items by categories, and results.

by John Coules; Joseph Liftik; Amy Harris
Boston Alcohol Safety Action Proj., Res. and Evaluation Group, 211 Congress St., Boston, Mass. 02110; Becker Res. Corp.
Contract DOT-HS-075-1-098
1972; 103p 3refs
Survey subcontracted to Becker Res. Corp. Rept. for 9 Dec 1971-20 Jan 1972. See also HS-802 737, HS-802 745, and HS-021 644.
Availability: Reference copy only

HS-802 735

PERFORMANCE EVALUATION AND EFFECTIVENESS OF POLICE ENFORCEMENT RELEVANT TO THE ALCOHOL SAFETY ACTION PROGRAM

Analysis of the Boston, Mass., Alcohol Safety Action Proj. (ASAP) police enforcement effectiveness was made by considering the ASAP and the regular patrols together, contrary to the guidelines of the Dept. of Transportation. It was felt that the contributions of the two types of patrol could not be isolated. Both enforcement patrols showed a significant effect in the reduction of fatal crashes and fatalities within the first full year of operation (1973). The ASAP patrols also served as a deterrent on driving habits other than those involving drinking, as shown by the decline in the number of all fatal crashes, whether alcohol-involved or not. Crash data were compared with baseline year data and with data from Springfield, Mass., as a control city. Both Boston police patrols and ASAP patrols, using a selective enforcement method concentrating on the heavy drinker, were successful in apprehending the serious drinking drivers and in getting the problem drinkers off the roads. ASAP patrols were more successful than either regular patrols or patrols in the control city in getting offenders to take the breathalyzer test. The increase in arrests for driving under the influence of alcohol in both the Boston area and in the control city show the catalytic effect of the ASAP program. Appended to the report is an evaluation of the effectiveness of the enforcement technique using a temporal analysis technique. The value of the ASAP patrols both as deterrent to nonalcohol-related violations and as a means of apprehending the drunk driver is upheld.

by John Coules
Boston Alcohol Safety Action Proj., Res. and Evaluation Group, 211 Congress St., Boston, Mass. 02110
Contract DOT-HS-075-1-098
Rept. No. Analytic-Study-3; 1974; 51p 4refs
Appended is "Evaluation of the Effectiveness of Enforcement Using a Temporal Analysis Technique in the Alcohol Safety Action Project" by John Coules.
Availability: Reference copy only

HS-802 736

THE EFFECTIVENESS OF THE ASAP PROGRAM TOTAL PROJECT IMPACT

Analysis of the total impact of the Boston, Mass., Alcohol Safety Action Proj. (ASAP) concerns fatal crashes, arrests for driving under the influence of alcohol, and the impact of the public information and education campaign, on the assumption that 1972 was not a fully operational year. The Boston ASAP has significantly reduced fatal crashes in its first operational year compared with the upward trend noted in the baseline years of 1971 and 1972. The reversal of the trend in Boston was not apparent in the fatal crashes occurring in Massachusetts as a whole, which showed a continuous upward trend over the same three years. Nighttime fatal crashes indicative of alcohol involvement during 1973 showed a 32% reduction over the baseline years 1969-1972. Boston ranked third of 21 ASAP's in the reduction of nighttime fatal crashes. Drunk driving arrests in Boston have increased over 300%. That Boston police are arresting the heavy drinker is shown by the fact that 81% of all cases entering rehabilitation are problem drinkers. Average blood alcohol level for all those in the program was .20%. The Boston ASAP has met its objectives within its first fully operational year. Appended to the report is an evaluation of the public information campaign by ASAP as measured by a telephone survey. There has been some improvement in general awareness of a campaign like ASAP's, in knowledge about the number of deaths attributed to alcohol, and in knowledge of the legal penalty for drunk driving. Personal patterns of drinking and driving behavior, however, showed no influence by the ASAP campaign.

by John Coules
Boston Alcohol Safety Action Proj., Res. and Evaluation Group, 211 Congress St., Boston, Mass. 02110
Contract DOT-HS-075-1-098
Rept. No. Analytic-Study-1; 1974; 64p 2refs
Appended is "A Telephone Survey on Alcohol and Traffic Safety Issues Relevant to Evaluation of a Public Information Campaign" by John Coules and Amy Harris.
Availability: Reference copy only

HS-802 737

ALCOHOL AND TRAFFIC SAFETY ISSUES RELEVANT TO EVALUATION OF A PUBLIC INFORMATION CAMPAIGN. A HOUSEHOLD SURVEY. RESEARCH REPORT

This second household survey for the Boston, Mass., Alcohol Safety Action Proj. (ASAP) was made of 500 residents age 16 and older during Sep-Oct 1973 to assess the impact of ASAP's public information and education (PIE) campaign. Demographic data showed that the random sample was very similar to that of the first survey, thus ensuring validity of comparisons between the two. Items were divided into six categories: traffic accidents and drinking drivers; knowledge of the law and alcohol usage; driving habits; drinking patterns; alcohol and traffic safety; and fact sheet (opinions on methods to improve traffic safety). The population's knowledge of traffic safety findings did not increase since the first survey. There was a significant increase, however, in the percentage of those who rated driving while intoxicated a most serious offense. There was also an increase in the percentage of those who had heard of a campaign to reduce alcohol-related traffic deaths. Of the sample, 28% were heavy or moderate drinkers who drove an automobiles, 39% were heavy or moderate drinkers, 77% drank alcoholic beverages, and 31% drove an automobile often or occasionally after drinking alcoholic beverages. When respondents were questioned on whether they would favor adoption of certain traffic safety measures, half were not significantly influenced or affected by presentation of information on alcohol involvement in traffic accidents. The PIE campaign has had little effect on the Boston population; a sales promotional approach should be adopted which

emphasizes the positive aspects of traffic safety rather than using scare tactics.

by Mathew R. Dovidio; John Coules
Boston Alcohol Safety Action Proj., Res. and Evaluation Group, 211 Congress St., Boston, Mass. 02110
Contract DOT-HS-075-1-098
1974; 87p 4refs
Survey subcontracted to Inst. for Consumer Psychology. See also HS-802 734, HS-802 745, and HS-021 644.
Availability: Reference copy only

HS-802 738

AN ANALYTICAL STUDY OF ALCOHOL INVOLVEMENT IN FATAL CRASHES IN BOSTON, 1971 AND 1972. ANALYTIC REPORT

Data gathered by the Boston, Mass., Alcohol Safety Action Proj. (ASAP) included the following: total motor vehicle fatalities in Boston and Springfield for 1969 through 1972; number of drivers killed in both cities for 1971 and 1972; percentage of fatalities by type in each city for 1971 and 1972; and distribution of blood alcohol levels (BAC's) and means by type of fatality for 1971 and for 1972. There was a reduction in the mean BAC for alcohol-related driver fatalities in Boston, although there was a slight increase in fatalities. In Springfield, the control city, there was a significant increase in the number of fatalities and the mean BAC increased.

by Amy Harris
Boston Alcohol Safety Action Proj., Res. and Evaluation Group, 211 Congress St., Boston, Mass. 02110
Contract DOT-HS-075-1-098
1973; 8p
Availability: Reference copy only

HS-802 739

AN ANALYSIS OF DRINKER DIAGNOSIS AND REFERRAL ACTIVITY

The judicial and rehabilitative system of the Boston, Mass., Alcohol Safety Action Proj. (ASAP) is described in terms of its diagnostic procedure, drinker classification and referrals, clients referred, impacts on the judicial system and on community rehabilitation resources, effect on recidivism, countermeasures and their costs, and the drinking diagnosis of the problem drinking driver. Of the total 1086 offenders, 79% were either found guilty or were placed on ASAP and court supervision under a continuance. The dramatic increase in the number of such continuances without findings was due to the availability of ASAP rehabilitation programs as an alternative to the mandatory one-year license revocation of a conviction. There were sharp decreases in acquittals, appeals, and plea bargainings. The Boston City Hospital Alcoholism Clinic established a system of immediate treatment for ASAP referrals. Recidivism data suggest that monitoring during rehabilitation is helpful; recidivism dropped 5.2% for ASAP participants but remained stable for those not participating in ASAP. Effect of follow-up activities, which take up 40% of the probation officer's time, is not yet known. Costs for diagnosis and referral have been reduced. Arrest record, drinking habits, general health, and familial alcoholism were the factors related to alcoholism diagnosis rather than general demographic characteristics such as family or work disintegration, acute medical problems, or generally deteriorated appearance. ASAP seems to reveal the hidden alcoholic who has not previously had treatment in spite of his problem. Expert clinical evaluation is much preferred to reliance on the subject's responses to questions as a means of detecting a drinking problem.

Boston Alcohol Safety Action Proj., Rehabilitation Evaluation Staff, 211 Congress St., Boston, Mass. 02110
Contract DOT-HS-075-1-098
Rept. No. Analytic-Study-5; 1974?; 45p 5refs
Rept. for fiscal year 1973.
Availability: Reference copy only

HS-802 740

TOTAL PROJECT IMPACT, BOSTON ASAP

Review of the Boston, Mass., Alcohol Safety Action Proj. (ASAP) shows that nighttime fatal crashes dropped 24% during the ASAP period. The percentage of such fatalities having a "had been drinking" blood alcohol level (BAC) decreased 24%. Arrests for drunk driving increased from a baseline annual average of 550 to 1370 averaged for the three years of ASAP operation. A presentence investigation procedure for drunk driving cases was incorporated into state law in 1974, and the ASAP systems approach also is now part of the law. Alcohol education and rehabilitation programs are self-supporting because of the $200 fee assessed of each referral. That the enforcement philosophy of the Boston ASAP was truly selective is shown by the 24% decrease in nighttime fatal crashes. The 1974 household survey showed that 87% estimated either correctly or conservatively how many drinks would make a person an unsafe driver. The Boston ASAP never agreed that a saturation enforcement program based on a rate of 25-35 drunk driving arrests per thousand licensed drivers was a sine qua non of a successful ASAP. It is felt that such arrest activity, achieved at the expense of the rest of the sanctioning system, would have an overall negative effect. Comparison of arrest rates with fatal crashes in various ASAP cities shows that those cities having the highest arrest rates had increases in nighttime fatals whereas those cities having the lowest arrest rates had decreases in nighttime fatal crashes. Some of the best demonstration sites, including Boston, were not selected for ASAP continuation because the selection process was based on a specious evaluative decision. ASAP enforcement activities during 1975 were hampered by the great demand on the police force due to the Federal school desegregation order.

by Richard X. Connors
Boston Alcohol Safety Action Proj., 211 Congress St., Boston, Mass. 02110
Contract DOT-HS-075-1-098
Rept. No. Analytical-Study-1; 1974?; 85p 5refs
Availability: Reference copy only

HS-802 741

ANALYSIS OF ASAP PATROL ACTIVITY

Patrol strategy of the Boston, Mass., Alcohol Safety Action Proj. (ASAP) was to arrest the speeding, hostile driver who is impaired by alcohol, based on a study that determined that nighttime fatal crashes in Boston were caused by such an individual. Of those offenders who were referred to ASAP, 80% were found to be problem drinkers. Almost 40% of those arrested were nonresidents of Boston heading southeast or southwest toward home. It is felt that the duty of the police is to prevent violence rather than to reduce the incidence of alcohol-impaired driving; therefore arrests were made only of

the most likely or dangerous suspects. The Boston ASAP does not believe that fear of arrest helps control drunk driving.

by Richard X. Connors
Boston Alcohol Safety Action Proj., 211 Congress St., Boston, Mass. 02110
Contract DOT-HS-075-1-098
Rept. No. Analytical-Study-3; 1974; 29p
Availability: Reference copy only

HS-802 742

BOSTON ALCOHOL SAFETY ACTION PROJECT. FINAL REPORT FOR THE YEARS 1972 - 1973 - 1974. SECTION 1

After the 22 months that the Boston, Mass., Alcohol Safety Action Proj. (ASAP) was fully operational, the following measures of its success are observed. Fatal crashes decreased 18% during the ASAP years 1972-1974. Total fatal crashes in Boston during the ASAP years were lower than any three-year period in Boston prior to ASAP. Fatal crashes ran counter to the statewide trend during the same period. Nighttime fatal crashes in Boston decreased 24.4% during the ASAP period, due directly to the activities of ASAP. In those sections of the city in which ASAP-funded selective enforcement operated, a visible and significant reduction was observed in nighttime fatal crashes. A 40% reduction in nighttime fatal crashes was achieved during the years when the Boston Police Dept. deployed an ASAP patrol. Decreases in nighttime fatal crashes within Boston Police jurisdiction occurred in both motor vehicle occupant and pedestrian categories. The Office of Pedestrian and Driver Programs' insistence that a high rate of DWI arrests per 1000 licensed drivers is a sine qua none of a successful ASAP program is unsupported by the experience of the existing ASAP's: tabulated data are presented which show that nighttime fatal crashes decreased in areas having low arrest rates and increased in areas having high arrest rates. The Boston ASAP, unlike many other ASAP's, actually performed all services itself, with the exception of making the actual arrest or adjudicatory decision. The actual cost of sanctioning for drunk driving per person can be broken down in the following manner: one year of probation, $254; participation in an education program, $45-$55; evaluation intake and exit interview, $60; and work on problem drinking problem, $175-$190. A 4.5 to 1 return on the ASAP dollar was given, based on 42 fewer fatal crashes. Legislative changes in 1975 broadened juridical discretion to include the "continuance without a finding" mechanism by which the court can refer persons to ASAP-like programs. While arrests for driving while intoxicated have increased outside of Boston, the Boston police force itself has been preoccupied with the problems generated by the desegregation order of Boston schools; the police can handle only police emergencies besides this responsibility. Reports for the enforcement, judicial, rehabilitation, and public information activities of ASAP are included, as is a 22-month report, a report on early intervention, and a report on treating the problem drinking driver.

by Richard X. Connors
Boston Alcohol Safety Action Proj., 211 Congress St., Boston, Mass. 02110
Contract DOT-HS-075-1-098
1976?; 93p 11refs
Availability: Reference copy only

HS-802 743

AN ANALYTIC STUDY OF JUDICIAL DISPOSITION FOR ALCOHOL RELATED TRAFFIC ARRESTS IN BOSTON

Comparison is made of enforcement activities in relation to a rests for driving under the influence of alcohol before an after the Boston, Mass., Alcohol Safety Action Proj. becam functional. Random choice was made of 100 cases in the fir quarter of 1973 (50 ASAP patrol arrests and 50 regular patr arrests), and complete traffic record checks and license check performed. Baseline data were chosen from available 1971 an 1972 data. There was no significant difference in case dispos tion between ASAP arrests and regular arrests. Compariso with the baseline data, however, shows a significant increas in cases continued without a finding. ASAP patrols got mor blood alcohol levels (BAC's) than did regular patrols, th BAC's were lower for those arrested by ASAP patrols, an BAC's were higher for those cases continued without a findin than for those cases judged either guilty or acquitted. Of th 66 cases continued without a finding, 57 were considere problem drinkers and were referred to classes and counselling four people entered ASAP from a guilty finding. Both ASA and regular patrols seem to be operating within an enforce ment framework which neither biases or hinders the decisior making process of the judiciary and rehabilitative activities Comparison of disposition and BAC data from Springfield Mass., shows that Springfield continues to have a high per centage of guilty rather than continued findings and a high per centage of BAC test refusals. ASAP provides the Boston ju diciary with an alternative to acquittals and guilty findings.

by Amy Harris
Boston Alcohol Safety Action Proj., Res. and Evaluation Group, 211 Congress St., Boston, Mass. 02110
Contract DOT-HS-075-1-098
Rept. No. Analytic-Report-4; 1974; 27p
Availability: Reference copy only

HS-802 744

AN EXAMINATION OF TWO EVALUATION TECHNIQUES FOR TYPES OF DRUNK DRIVERS. RESEARCH REPORT

As a part of the activities of the Boston, Mass., Alcoho Safety Action Proj. (ASAP), a study was made of the validity of the Michigan Alcohol Screening Test (MAST) in early determination of problem drinkers within a given group. Fou types of drunk drivers were sampled from over 1500 cases ar rested in Boston: recidivists, recidivists with criminal records criminal only, and no-record types. The MAST was shown t be equivalent to a professional clinical evaluation method i identifying problem drinkers for entry into a rehabilitation pro gram. Since it can be administered by a probation officer i the court, it is more cost-effective than use of professiona clinical evaluators. Alcohol involvement is greater in th recidivist-criminal type than in other drunk driver types. Suc cessful rehabilitation of the drunk driver is not always possi ble, as he considers himself to be a normal drinker who ha not lost control.

by John Coules
Boston Alcohol Safety Action Proj., Res. and Evaluation Group, 211 Congress St., Boston, Mass. 02110
Contract DOT-HS-075-1-098
1974; 18p 8refs
Availability: Reference copy only

HS-802 745

A HOUSEHOLD SURVEY ON ALCOHOL AND TRAFFIC SAFETY ISSUES

The Boston, Mass., Alcohol Safety Action Proj. (ASAP) conducted a third household survey in Dec 1974 to assess the effects of ASAP's intensive two-year campaign of public education and information. A random sample was made of 500 Boston residents whose demographic characteristics were very similar to those of the previous survey samples. The overall effect of the Boston ASAP public information and education campaign was limited. There was a lack of increase in knowledge about traffic accidents and drinking drivers. There was no significant change in attitude toward the offense of drinking under the influence of liquor (the greatest percentage rated it as a most serious offense) but there was a slight rise in knowledge of the meaning of blood alcohol level (BAC). There was confusion concerning the new drunk driving law, but when the respondents were enlightened, the majority felt that the law's rehabilitative approach was fair. Respondents favored greater enforcement and more public information as methods of reducing alcohol-related traffic deaths, although there was a 2% drop in the percentage of those who knew of any such campaign. The percentage of heavy and moderate drinkers rose from 28% to 35%; 15% of them drive an average of 27 miles per day. The figure of 77% of respondents who drink alcoholic beverages remained constant from the previous year. There was a reduction of from 30% to 23% in drivers who drove after drinking; no statistical test of this was made, however, due to the great number of bad codes. Appended are the questionnaire, its results, and a listing of the questionnaire items by category.

Boston Alcohol Safety Action Proj., Res. and Evaluation Group, 211 Congress St., Boston, Mass. 02110; Institute for Consumer Psychology
Contract DOT-HS-075-1-098
Rept. No. AS-7; 1975; 87p 4refs
Reports of the first two surveys are HS-802 734 and HS-802 737. Survey subcontracted to Inst. for Consumer Psychology.
Availability: Reference copy only

HS-802 746

1972 SD:ASAP [SOUTH DAKOTA ALCOHOL SAFETY ACTION PROJECT] PUBLIC INFORMATION/EDUCATION SURVEY

A total of 5099 people participated in a survey conducted at South Dakota fairs in Aug and Sep 1972 to assess knowledge of the South Dakota Alcohol Safety Action Proj. (SD:ASAP) and knowledge of traffic safety problems related to alcohol use. The sites of the survey were the South Dakota State Fair in Huron, the Corn Palace Days at Mitchell, the Central States Fair at Rapid City, and the Sioux Empire Fair at Sioux Falls. Men constituted 52.4% of the respondents, women 47.6%. The sample contained a greater proportion of younger respondents, but responses were consistent across age groups so that age was not an important factor. More than half either correctly estimated or overestimated the frequency of alcohol involvement in traffic accidents, and about two thirds incorrectly believed that the social drinker and not the problem drinker is the major problem. Almost two thirds incorrectly guessed the presumptive limit of intoxication except for those in the Sioux Falls area where only about one third incorrectly guessed. Estimates of the risk of arrest while driving under the influence of alcohol averaged 31.3%. Over three fourths of the respondents were either in favor of or indifferent toward a pre-arrest blood alcohol concentration (BAC) check; only about 15% opposed random checks to detect drinking drivers. As for legislation requiring BAC tests of all fatally injured drivers, 65% were in agreement, 19% were indifferent, and 15% were opposed. About two thirds were in favor of increased penalties for those convicted of driving while intoxicated; 17% were opposed, the rest were indifferent. About one fourth felt that enforcement is not an effective deterrent to the drinking driver. Only 7% disagreed with the idea of providing required treatment for problem drinkers convicted of drinking while intoxicated. About 75% were willing to accept at least some increase in taxes to support a program to reduce alcohol-related traffic accidents. About two thirds knew of the SD:ASAP. The rural residents tended to get more information from radio, and the urban resident, from other people.

by David L. Struckman; Vernon S. Ellingstad
South Dakota Alcohol Safety Action Proj., South Dakota Dept. of Highways, Pierre, S. Dak. 57501; University of South Dakota, Human Factors Lab., Vermillion, S.Dak.
Contract DOT-HS-045-1-061
Rept. No. Special-Evaluation-3; 1973; 21p
Subcontracted to Univ. of South Dakota.
Availability: Reference copy only

HS-802 747

SD:ASAP [SOUTH DAKOTA ALCOHOL SAFETY ACTION PROJECT] ANNUAL REPORT [1972]

The programs of the South Dakota Alcohol Safety Action Proj. (SD:ASAP) have been closely allied with those of the state Hwy. Safety Prog. (known as the 402 program). Progress during the first year (1972) included negotiation and enforcement of all subcontracts and memos of agreements, performance evaluation of selected subcontracts, submission of the preliminary State Alcoholism Plan to the National Inst. on Alcohol Abuse and Addiction (NIAAA), improvement in the Management Information System, and performance of an Organizational Development Workshop. The contract monitor has been actively involved. Problems have included the lack of feedback from evaluation reports, very long delays in approval of documents for distribution, and lack of funds with which to hold a meeting of the technical committee for Law Enforcement/Drive Control and the Decision and Treatment Processes. There has been a high rate of turnover of the management staff, but it has been determined that the individuals leaving are moving into the management structure of the Div. of Alcoholism; the liaisons thus formed between the groups will tend to improve the state's overall program. The report contains the following types of material: a description of the SD:ASAP community; a statement of objectives; description of the countermeasure programs, including a fiscal description; a summary of activities, including an analysis of expenditures, list of catalytic effects, and annual milestone charts; plans for the following year; and tabulated data of the various projects. In addition, in-depth reports are presented for the following activities: law enforcement; licensing and registration; judicial programs; rehabilitation; public information and education; and legislation and regulation. These activities are also studied in terms of geographic area.

South Dakota Alcohol Safety Action Proj., South Dakota Dept. of Highways, Pierre, S. Dak. 57501
Contract DOT-HS-045-1-061
Rept. No. SD:ASAP-Annual-Report-1972; 1973; 317p
See also HS-802 751.
Availability: Reference copy only

HS-802 748

AN INVESTIGATION OF DRINKING-DRIVING CHARACTERISTICS OF SOUTH DAKOTA MOTORISTS: BASELINE S.D. ASAP [SOUTH DAKOTA ALCOHOL SAFETY ACTION PROJECT] ROADSIDE SURVEY

A summary and analysis are presented of a baseline-period roadside survey of drivers, including breath tests for alcohol, intended as an intermediate measure of overall effectiveness of the South Dakota Alcohol Safety Action Proj. (SD:ASAP). The 14 sites included locations in ten cities and four Indian reservations; most surveys were conducted on Thursday, Friday, and Saturday evenings in the time periods 7 P.M. to 9 P.M., 10 P.M. to 12 P.M., and 1 A.M. to 3 A.M. Sampling rates for those time periods were 10%, 20%, and 50% respectively. Of 857 motorists stopped, 814 agreed to participate in the survey, including the breath test. Two-man survey teams worked from a panel van equipped with a Stephenson Model 800 Breathalyzer. Results showed that 30.47% of all drivers participating had been drinking sufficient quantities of alcohol to show a measurable blood alcohol concentration (BAC), and that 7% of all participants showed levels exceeding the presumptive level of intoxication in the State of South Dakota. Percentages of legally intoxicated drivers by time period were 3.51% for the 7 P.M. to 9 P.M. period, 6.80% for the 10 P.M. to 12 P.M. period, and 13.97% for the 1 A.M. to 3 A.M. period. The mean BAC of participants is elevated beyond an acceptable level, and is inflated by excessive numbers of drivers who show substantially elevated blood alcohol concentrations. The number of cases in the .01-.04% BAC class is substantially smaller than that predicted by the Poisson distribution; the frequency of the .05-.09% BAC class is close to the Poisson prediction; and beyond the .10% BAC level, the observed frequency distribution stays well above the Poisson distribution. It is likely that many of those found to be legally intoxicated are problem drinkers who habitually operate motor vehicles under the handicap of alcohol impairment. The SD:ASAP will have to apply rigorous enforcement measures to apprehend those having BAC's of from .10% to .20%. New legislation might be required to give the enforcement agencies greater flexibility and capability. It is unlikely that public information and education activities will alter the behavior of the target group.

by Vernon S. Ellingstad
South Dakota Alcohol Safety Action Proj., South Dakota Dept. of Highways, Pierre, S. Dak. 57501; University of South Dakota, Human Factors Lab., Vermillion, S. Dak.
Contract DOT-HS-045-1-061
Rept. No. Special-Evaluation-Report-1; 1972; 71p
Prepared by Vernon S. Ellingstad, Univ. of South Dakota, Human Factors Lab., Vermillion, S. Dak., under subcontract for the South Dakota Alcohol Safety ActionProj. (SD:ASAP).
Availability: Reference copyonly

HS-802749

ALCOHOL-DRIVER IMPROVEMENT PROGRAM CURRICULUM GUIDE

Theprogram is designed for use by social drinkers who have beenconvicted of driving while intoxicated (DWI), but is applicable for use by any group to teach the effects alcohol has on one's ability to drive a vehicle. The text is in narrative form to be used with 35 mm slides. The sections of the guide are the following: introduction; the driving task; alcohol and its effect on the human mechanism; human skills and safe driving; a safe driver must be able to see what is about him; a safe driver must be able to decide what to do about what he sees about him; a safe driver must be able to act upon his decision of what to do about what he sees about him; and summary concerning the drunken driver. HSL 78-03

by Roger E. Hagen; George I. Samis
South Dakota Alcohol Safety Action Proj., South Dakota Dept. of Highways, Pierre, S. Dak. 57501
Contract DOT-HS-045-1-061
1972; 44p
Prepared in cooperation with South Dakota Hwy. Patrol.
Availability: Reference copy only

HS-802 750

PERFORMANCE OF SD:ASAP [SOUTH DAKOTA ALCOHOL SAFETY ACTION PROJECT] PARTICIPATING LAW ENFORCEMENT AGENCIES

The law enforcement measures of the South Dakota Alcohol Safety Action Proj. (SD:ASAP) were successful in increasing detection of the alcohol-impaired driver in all but two locations, as shown by tabulated data on frequency of such identification. Risk of apprehension is now double that of pre-SD:ASAP. The traffic enforcement program needs to make the driver aware that the risk of apprehension for driving while intoxicated is high, by high visibility of the officer performing traffic enforcement and by uniformly strong enforcement policy. An administrative tool for measuring enforcement efficiency, the Enforcement Index, is computed by dividing the number of convictions by the number of fatal or injury accidents. The ten target cities of SD:ASAP should develop an index of 20; the two Indian reservations and the five Hwy. Patrol Districts, an index of 10. Enforcement activities include surveillance of drivers whose licenses were suspended or revoked, roadblock enforcement, and selective enforcement patrols. Each participating agency is considered in terms of its current enforcement index (for the cities) and other data. Recommendations for the Hwy. Patrol include establishment of performance standards, use of selective enforcement techniques, development of accident records systems, and an increase in strength.

by Roger E. Hagen; George I. Samis
South Dakota Alcohol Safety Action Proj., South Dakota Dept. of Highways, Pierre, S. Dak. 57501
Contract DOT-HS-045-1-061
1972; 24p
Prepared in cooperation with South Dakota Hwy. Patrol.
Availability: Reference copy only

HS-802 751

A STATISTICAL DESCRIPTION OF FATAL CRASH DRIVERS

The degree to which alcohol represents a causative factor motor vehicle crashes is studied by a comparison of baseline and 1972 data on blood alcohol concentrations (BAC's) of fatally injured drivers, statistical description of all drivers involved in fatal motor vehicle crashes during 1972, and profiles of 1972 fatally injured drivers in crashes. Data currently available do not provide a reliable basis for the assessment of the impact of the South Dakota Alcohol Safety Action Proj. (SD:ASAP). About 85% of the fatal crash drivers were men, and 55.5% were under 30 years of age. Crashes involving

drinking drivers tended to occur between 8 P.M. and 4 A.M., and on weekends. They intended to be fatal to the drinking driver more often than to others involved. Those involved in crashes not related to alcohol had proportionally fewer previous crashes. No statistically significant differences were observed in frequency of previous convictions for driving while intoxicated among crash-involved drivers in the following three groups: those who had been drinking, those who had not been drinking but another driver in the crash situation had been drinking, and those who had not been drinking and no other driver in the crash situation had been drinking.

by Vernon S. Ellingstad
South Dakota Alcohol Safety Action Proj., South Dakota Dept. of Highways, Pierre, S. Dak. 57501; University of South Dakota, Human Factors Lab., Vermillion, S. Dak.
Contract DOT-HS-045-1-061
Rept. No. Analytic-Study-2; 1973; 33p
See also main part of 1972 Annual Report, HS-802 747.
Subcontracted to Univ. of South Dakota.
Availability: Reference copy only

HS-802 752

AN ANALYSIS OF ULTIMATE PERFORMANCE MEASURES TO DETERMINE TOTAL PROJECT IMPACT

Analysis of ultimate impact of the South Dakota Alcohol Safety Action Proj. (SD:ASAP) was made by analytic inspections of the time series of a variety of subsets of motor vehicle crashes which are most likely to be affected by SD:ASAP activities: total crashes, alcohol-related crashes, nighttime crashes, weekend crashes, and single-vehicle crashes. In each case, the behavior of the time series during three pre-SD:ASAP years and two years of SD:ASAP operations was evaluated to determine whether changes in level or drift of the series had occurred which might be taken as indices of SD:ASAP impact. All such analyses are addressed to motor vehicle crash indices obtained on a statewide basis. Additional analyses were made of a more restricted series of proxy impact measures obtained through conduct of roadside survey activities between Sep 1971 and Dec 1973. The only statistically significant modification of motor vehicle crash experience potentially attributable to the influence of SD:ASAP was an increasing linear trend across the entire time series of statewide, seasonally adjusted injury crashes; some influence suppressed the growth of the time series predicted by the overall linear trend. Additional indication of SD:ASAP influence was that the proportion of individuals with blood alcohol concentrations (BAC's) over .10% were found to decrease across time. Increases in the proportion of individuals with BAC's over .05% and .10% during the 1 A.M. to 3 A.M. period across time are difficult to account for. Comparisons of the profiles of individuals arrested for driving while intoxicated and alcohol-impaired individuals involved in fatal crashes indicate that SD:ASAP law enforcement operations were targeted at the appropriate target population and that the two groups of alcohol-related drivers were indeed similar. Therefore, any failure to achieve desired levels of impact may be more a question of the amount of enforcement rather than of enforcement directed toward the wrong population of drivers.

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South Dakota Alcohol Safety Action Proj., South Dakota Dept. of Public Safety, Pierre, S. Dak. 57501; University of South Dakota, Human Factors Lab., Vermillion, S. Dak.
Contract DOT-HS-045-1-061
Rept. No. SD:ASAP-Analytic-Study-1; 1974; 123p 18refs
See also HS-802 758. Subcontracted to Univ. of South Dakota.
Cover title: An Analysis of Total Project Impact.
Availability: Reference copy only

HS-802 753

AN ANALYSIS OF ASAP PATROL ACTIVITY

Evaluation of the law enforcement and driver control activities of the South Dakota Alcohol Safety Action Proj. (SD:ASAP) involved study of the overall change in alcohol-related traffic enforcement from the three year baseline period to 1969-1971 to the two year SD:ASAP period of 1972 and 1973. In addition, the relative effectiveness of ASAP vs. regular patrol procedures in generating measures of alcohol-related traffic enforcement, the relative effectiveness of the surveillance, roadblock, and selective enforcement activities, and the difference in characteristics of drivers contacted by the regular patrol or ASAP patrol procedures and those drivers contacted by roadside interview were examined. There was a significant increase in the frequency of arrests for driving while intoxicated and a significant decrease in mean blood alcohol concentration (BAC) of such arrests from the baseline to the ASAP active period. ASAP patrol procedures were shown to be more effective than those of the regular patrol. The roadblock technique is more effective than selective enforcement in terms of personal contacts with drivers per manhour. Arrested drivers had significantly higher BAC's than did the sample of drivers illegally operating vehicles.

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Contract DOT-HS-045-1-061
Rept. No. SD:ASAP-Analytic-Study-3; 1974; 159p 23refs
See also HS-802 758, and HS-802 754. Subcontracted to Univ. of South Dakota. Cover title: An Analysis of A/R Law Enforcement Activity.
Availability: Reference copy only

HS-802 754

PRELIMINARY EVALUATION OF PORTABLE BREATH TEST DEVICES FOR PRE-ARREST TESTING IN THE SOUTH DAKOTA ASAP

ALERT portable breath testing devices were used by law enforcement agencies cooperating with the South Dakota Alcohol Safety Action Proj. (SD:ASAP) 850 times between Oct 1973 and Mar 1974. Arrests for driving while intoxicated (DWI) were made in 248 of those cases. This amounted to use of the devices in about one third of the DWI arrests. The units are not very precise when compared to other forms of chemical testing, including the Breathalyzer. Calibration of the units at .06 and .12 blood alcohol concentration (BAC) cutoff points, however, for warn and fail readings is an operationally satisfactory hedge against false positive readings. There was no conclusive evidence of improved total agency or ASAP

patrol performance as a function of availability and use of portable breath testing equipment, although there was a substantial overall increase in DWI arrest rates in the time period studied. No differences were found in blood alcohol concentration distributions or judicial disposition distributions between arrests supported by portable breath testers and those which were not; the objective of increased frequency of detection and arrest of alcohol-impaired drivers at lower BAC's was not achieved.

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Contract DOT-HS-045-1-061
Rept. No. SD:ASAP-Analytic-Study-3-Supp; 1974; 39p
See also HS-802 753. Subcontracted to Univ. of South Dakota.
Availability: Reference copy only

HS-802 755

AN ANALYSIS OF THE JUDICIAL DISPOSITION OF ALCOHOL RELATED TRAFFIC ARRESTS

The relationship between the South Dakota Alcohol Safety Action Proj. (SD:ASAP) and the judicial system of the state was studied by examining the distribution of judicial dispositions as they are related to key parameters within SD:ASAP and by examining the personal characteristics of individuals processed by the judicial system and their relationship to case disposition. Dissimilarities between courts in the assignment of dispositions included an inflated number of reduce-charge dispositions by the Sioux Falls municipal court system and an increased number of acquitted/dismissed dispositions by the tribal court systems. There was a slight decrease in the percentage of cases assigned a guilty disposition for arrests for driving while intoxicated (DWI) from 1972 to 1973. There was shown to be no systematic bias in the distribution of dispositions related to which type of law enforcement activity generated the arrest, either ASAP patrol or regular patrol. There was a large percentage of those having blood alcohol concentrations (BAC's) of above .10% at the time of arrest who received the disposition other than guilty of DWI. There was more use made of SD:ASAP treatment processes by the court system and a consistent pattern in the assignment of judicial sanctions. Disposition was primarily influenced by BAC level at the time of arrest, rather than age of the individual or the number of previous arrests.

by Michael A. Lees
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Contract DOT-HS-045-1-061
Rept. No. SD:ASAP-Analytic-Study-4; 1974; 92p 5refs
See also HS-802 758. Subcontracted to Univ. of South Dakota.
Cover title: An Analysis of ASAP Impact on the Traffic Safety System.
Availability: Reference copy only

HS-802 756

AN ANALYSIS OF DRINKER DIAGNOSIS AND REFERRAL ACTIVITY

The Decision/Treatment Processes subsystem of the South Dakota Alcohol Safety Action Proj. (SD:ASAP) is described in detail, including a cost-effectiveness analysis, and the validity of its diagnosis and referral functions is studied. In addition, the referral process is examined to determine the extent to which referral recommendations are implemented, what judicial incentives there are for rehabilitation referral, and the appropriateness of particular referrals. The relationship of diagnostic and referral functions is studied in relation to indices of rehabilitation success. The 3557 presentence investigation (PSI) contacts during the first two operational years required 8.109 hours per case for diagnostic functions. The 2633 court referrals to reeducation or rehabilitation programs required an additional 9.5 hours per case for such activities as liaison with the courts, arrangement for the execution of court-ordered referrals, and follow-up on referred clients. Drinker classifications made by the D/TP subsystem were found to be significantly discriminable on the basis of 14 key variables including age, blood alcohol concentration (BAC) at arrest, prior convictions on various charges, educational level, income class, drinking pattern, marital status, work pattern, and Mortimer-Filkins score. The full set of predictor variables was found to account for the majority of variance in the drinker type criterion measure. The same set of 14 predictor variables was found to be important in the determination of referral recommendation or actual referral. The courts agreed to referral recommendations in over 90% of the cases on which such data were available. No significant differences in re-arrest recidivism were found between the four drinker types (social, problem, serious problem, chronic alcoholic) or between individuals referred or those not referred for rehabilitation. Recidivists were found to be discriminable from nonrecidivists among both problem and nonproblem drinkers, however. It may be possible to develop indices of treatability based on information obtained in the PSI. Appended to the report are a curriculum for driver improvement school, a guide for problem drinker driver classes, the PSI case file, and the PSI coding manual.

by Vernon S. Ellingstad
South Dakota Alcohol Safety Action Proj., South Dakota Dept. of Public Safety, Pierre, S. Dak. 57501; University of South Dakota, Human Factors Lab., Vermillion, S. Dak.
Contract DOT-HS-045-1-061
Rept. No. SD:ASAP-Analytic-Study-5; 1974; 157p 1ref
See also HS-802 758. Subcontracted to Univ. of South Dakota.
Availability: Reference copy only

HS-802 757

AN ANALYSIS OF ALCOHOL REHABILITATION EFFORTS

A total of 1975 problem drinkers, 625 nonproblem drinkers, and 32 individuals of unidentified drinker type have been referred to various reeducation/rehabilitation programs during the first two operational years of the South Dakota Alcohol Safety Action Proj. (SD:ASAP). Alcohol safety schools are the more frequently used referral resources, with 57.32% of these individuals identified as problem drinkers referred to Problem Drinker Driver Classes (PDDC) as their only referral modality. For nonproblem drinkers, one-session Driver Improvement Schools (DIS) received 60.96% of all referrals and PDDC classes an additional 32.0%. The programs have been effective in reducing recidivism. As for problem drinkers, individuals referred to Alcoholics Anonymous, PDDC, and outpatient treatment showed lower re-arrest indices than individuals exempted from treatment or individuals dropping out or failing to appear for treatment programs. As for nonproblem drinkers, DIS participants were observed to show a smaller mean rearrest index than did those referred to PDDC or those non-

problem drinkers entering the no-treatment group. Comparison of both recidivists and nonrecidivists by separate multiple discriminant analyses showed that recidivists were discriminable from nonrecidivists in both cases. The tendency toward recidivism may be a phenomenon predictable from information gained by presentence investigations.

by Vernon S. Ellingstad
South Dakota Alcohol Safety Action Proj., South Dakota Dept. of Public Safety, Pierre, S. Dak. 57501; University of South Dakota, Human Factors Lab., Vermillion, S. Dak.
Contract DOT-HS-045-1-061
Rept. No. SD:ASAP-Analytic-Study-6; 1974; 79p 1ref
See also HS-802 758. Subcontracted to Univ. of South Dakota.
Availability: Reference copy only

HS-802 758

SD:ASAP [SOUTH DAKOTA ALCOHOL SAFETY ACTION PROJECT] ANNUAL REPORT [1973]

The South Dakota Alcohol Safety Action Proj. (SD:ASAP) has been placed under the Hwy. Safety Div., the director of which is also the Governor's representative for highway safety. There was coordination with the Hwy. Safety Prog. (known as the 402 program). The management information system has been improved by such factors as computerization of the evaluation system and new systems for validity checking. A conference was held with law enforcement supervisors, and innovative manpower utilization measures developed. Use of 43 portable breath testers has yielded good results. Some cities are having trouble keeping up their arrest activity because of political pressures from liquor dealers. Some courts tended to reduce a driving while intoxicated (DWI) charge or dismiss the case rather than move to get the person into treatment or rehabilitation. A driver improvement school was opened in Sioux Falls to treat social drinkers; referral of social drinkers has jumped from 42% in 1972 to 73% in 1973. The public information and education activity continues to try to raise the perception of DWI arrest as a risk, by such measures as a tabloid, bumper stickers, key rings, matchbooks, blood alcohol level charts, and radio spots. The report contains the following types of material: description of the SD:ASAP community; description of project objectives; a statement of overall progress; fiscal review and description of the project, and a description of its catalytic effects. In addition, reports are made of the following specific activities: enforcement, judicial/rehabilitation, licensing and registration, legislative and regulatory, public education and information, and management and evaluation.

South Dakota Alcohol Safety Action Proj., South Dakota Dept. of Public Safety, Pierre, S. Dak. 57501
Contract DOT-HS-045-1-061
1974; 64p
See also HS-802 752--HS-802 757, and HS-802 759.
Availability: Reference copy only

HS-802 759

SD:ASAP [SOUTH DAKOTA ALCOHOL SAFETY ACTION PROJECT] ANNUAL REPORT 1974. APPENDIX H, TABLES

Tabulated data are presented on a quarterly basis for the following aspects of the South Dakota Alcohol Safety Action Proj. (SD:ASAP): total project impact on both fatal and injury-producing crashes involving single vehicles, multiple vehicles, and pedestrians; blood alcohol concentration (BAC) data for drivers killed and for drivers arrested for alcohol-related offenses; enforcement patrols both regular and ASAP; judicial disposition of alcohol-related traffic arrests and background investigation activity; rehabilitation status report; diagnosis and review activities; driver license record review; summary of public information and education activities; and financial and personnel data for the various programs.

[South Dakota Alcohol Safety Action Proj., Pierre, S. Dak. 57501]
Contract DOT-HS-045-1-061
Rept. No. Annual-Report-1974-App-H; 1975?; 117p
Availability: Reference copy only

HS-802 761

AN ANALYSIS OF TOTAL PROJECT IMPACT

The first three years of the South Dakota Alcohol Safety Action Proj. (ASAP), which began operations 1 Jan 1972, were evaluated in terms of ASAP's stated objectives of reducing alcohol-related crashes. A total of 27 sets of motor vehicle crash data were treated as interrupted time series with the interrupt occasioned by the 1 Jan 1972 onset of ASAP. A general linear model analysis of variance was utilized to assess drift, change in level and change in drift. Series were inspected for autocorrelation and seasonally adjusted as necessary. Statewide total injury and property damage crashes and weekend injury accidents showed a statistically significant decrease in drift as did fatal and injury accidents for Highway Patrol District's 4 and 6 and Brown County, subsequent to the introduction of ASAP. Reported alcohol-related fatal and injury accidents increased in drift during the same period. Possible decrease in level of the series due to the change in speed limit was controlled for statistically. Comparison of fatal and injury accidents with the non-ASAP states of North Dakota and Wyoming was also carried out with a general linear model analysis of variance. There was a significantly greater decrease in drift for South Dakota injury accidents than for control states during the same time period. Autopsy blood alcohol concentration (BAC) data did not show a decrease in BAC levels during the operational period. BAC data obtained from roadside surveys during the ASAP operational period did not indicate a decrease in BAC levels for the second half of the operational period as compared to the first half. Mean BAC's of individuals arrested for driving while intoxicated (DWI) during the baseline period and operational period (.212 vs. .193) were significantly different. Because of a number of confounding factors (improved police sensitivity, change in presumptive level of intoxication, etc.), BAC data were considered generally unreliable and not sensitive to project effect. Comparisons of crash-involved drivers who had been drinking with crash-involved sober drivers for the years 1972-1974 indicated that they differed with respect to age and sex and also the time of day and day of week of the accident. Comparison of fatal, injury, and property damage crash driver groups between baseline and operational years of ASAP indicated a greater proportion of fatal accidents were reported as alcohol-related during the operational period. Cost analysis of ASAP

indicated a substantial saving to society affected by the implementation of the project.

by D. P. Westra; V. S. Ellingstad
South Dakota Alcohol Safety Action Proj., South Dakota Dept. of Highways, Pierre, S. Dak.; University of South Dakota, Human Factors Lab., Vermillion, S. Dak.
Contract DOT-HS-045-1-061
Rept. No. SD:ASAP-Analytic-Study-1; 1975; 320p
Subcontracted to Univ. of South Dakota.
Availability: Reference copy only

HS-802 762

AN ANALYSIS OF A/R [ALCOHOL-RELATED] LAW ENFORCEMENT ACTIVITY

The law enforcement/driver control subsystem of South Dakota's Alcohol Safety Action Proj. (ASAP) was evaluated in terms of the overall change in arrests of those driving while intoxicated (DWI) across time, change in characteristics of DWI drivers across time and between ASAP and regular patrol, change in use of chemical tests in DWI arrests and the use and reliability of special equipment, and change in relative efficiency of ASAP enforcement activity across the three years of its operation (1972-1974). There was a significant increase in DWI arrests and in the sensitivity of arresting officers to DWI offenders in the lower blood alcohol concentration (BAC) ranges. Characteristics of DWI drivers changed considerably from the baseline period of 1969-1971 to the operational ASAP years of 1972-1974: more females, and younger drivers. ASAP has increased the use of Breathalyzer chemical test units. Special chemical test equipment shows a significant, positive effect on enforcement performance manifest in reduced arrest BAC levels. With the exception of the initial year of operation, ASAP efficiency was relatively stable during the operational period.

by T. J. Springer; J. H. Sapp; V. S. Ellingstad
South Dakota Alcohol Safety Action Proj., South Dakota Dept. of Highways, Pierre, S. Dak.; University of South Dakota, Human Factors Lab., Vermillion, S. Dak.
Contract DOT-HS-045-1-061
Rept. No. SD:ASAP-Analytic-Study-3; 1975; 178p 6refs
Subcontracted to Univ. of South Dakota.
Availability: Reference copy only

HS-802 763

AN ANALYSIS OF ASAP IMPACT ON THE JUDICIAL SYSTEM

The judicial system of the South Dakota Alcohol Safety Action Proj. (ASAP) was analyzed in terms of judicial disposition of arrests for driving while intoxicated (DWI), judicial sanctions for DWI convictions, judicial through-put and efficiency, and use of referral services. The courts showed a satisfactory outcome in a large proportion of DWI cases during ASAP's 1972-1974 operational period. There was a decrease in the percentage of adjudications during 1973, however. The Sioux Falls Municipal Court was found to have a low percentage of satisfactory outcomes in relation to the other courts. The DWI arrests of Municipal Police and of ASAP patrols were adjudicated with fewer guilty dispositions, but this was determined to be primarily attributable to the type of court processing the case than the arresting agency per se. The arrest blood alcohol concentration (BAC) of guilty dispositions decreased significantly during the operational period of the project and the courts were found to be utilizing BAC arrest evidence in the determination of satisfactory outcomes. Analysis of personal characteristics showed that age, race, and occupation biased the judicial disposition but that other factors such as BAC might have been influential. The recidivist rate for ASAP's operational period was 12%, of which 81.1% involved a first rearrest. As for judicial sanctions, there were substantial differences between court systems; courts appeared not to use sanctions as a positive incentive to rehabilitation. The increased processing time of DWI's during the first operational year decreased to near baseline figures by 1974. Both the percentage and number of backlog cases have continued to grow during the project. DWI offenders received increasing percentages of presentence investigations and referrals to rehabilitation during the ASAP period. The court system referred 93.1% of those DWI cases recommended for referral by ASAP.

by M. F. Smith; V. S. Ellingstad
South Dakota Alcohol Safety Action Proj., Dept. of Public Safety, Pierre, S. Dak.; University of South Dakota, Human Factors Lab., Vermillion, S. Dak.
Contract DOT-HS-045-1-061
Rept. No. SD:ASAP-Analytic-Study-4-1975; 1975; 184p 4refs
Subcontracted to Univ. of South Dakota.
Availability: Reference copy only

HS-802 764

AN ANALYSIS OF DRINKER DIAGNOSIS AND REFERRAL

The South Dakota Alcohol Safety Action Proj. (ASAP) drinker diagnosis and referral program is evaluated for its first three years of operation. Diagnosis and referral activities were part of the decision/treatment processes subsystem of ASAP, and functioned within the court systems. Presentence investigations (PSI's) were conducted of all individuals convicted of driving while under the influence of alcohol (DWI). Results of the diagnostic and referral processes are given, the judicial incentives for participation in rehabilitation are considered, and reliability and validity of the diagnostic and referral processes are analyzed, as are their cost effectiveness and their effects on reducing recidivism. Total impact and catalytic effects of the system are also considered. Drinkers were categorized into four groups: social, problem, serious problem, and alcoholic. Study of 25 variable characteristics showed that the characteristics of the categories coincided with those cited in the general literature, and that there were distinct differences in profiles among the four groups. Single modality referrals were most frequently associated with social or problem drinkers; multiple modality referrals were most frequently associated with serious problem drinkers. Reliability tests included plotting the percentage of each drinker classification across all court workers by month for the three-year period, then for the 1972 and 1973 period separately from 1974. There was a reasonable degree of validity and reliability associated with the drinker diagnosis and referral subsystems. No evidence was found to suggest that PSI alone or appropriate referral to rehabilitation reduced the probability of recidivism. Cost-effectiveness studies showed that the activities had become more efficient over the three-year period.

by D. L. Struckman
South Dakota Alcohol Safety Action Proj., South Dakota Dept. of Highways, Pierre, S. Dak.; University of South Dakota, Human Factors Lab., Vermillion, S. Dak.
Contract DOT-HS-045-1-061
Rept. No. SD:ASAP-Analytic-Study-5; 1975; 359p
Subcontracted to Univ. of South Dakota.
Availability: Reference copy only

HS-802 765

AN ANALYSIS OF ALCOHOL REHABILITATION EFFORTS

The rehabilitation efforts of the South Dakota Alcohol Safety Action Proj. (ASAP) were evaluated in terms of treatability of ASAP clients, effectiveness of treatment in changing drinking-driving behavior, effectiveness of treatment in inducing life changes, and effectiveness of problem drinker driver classes in changing knowledge and attitudes. Treatability was analyzed by discriminant analysis profile comparisons of clients completing treatment and dropouts or no-shows, and between nonrecidivists, typical recidivists, and instant recidivists. Personal characteristics and driving/police record variables were identified which differentiated the above profile groups for problem and nonproblem drinkers. Multiple linear regression equations were developed which significantly predicted number of recidivist arrests and lag time to rearrest from client profile data. For both discriminant analyses and regression analyses statistical relationships were weak, rendering these procedures of no practical use as screening/prediction techniques. Number of recidivist arrests, lag time to first recidivist arrest and blood alcohol concentration (BAC) at first recidivist arrest were used as proxy measures of drinking-driving behavior. Prior to analyses of treatment effects, treatment group client profiles were delineated with discriminant analysis. Modalities differed in client alcohol problem severity and sanction pattern. Optimal subsets of covariates were selected from among client profile variables with stepwise multiple regression. Quasiexperimental comparisons were made between treatment/no treatment groups and between clients completing treatment and drop/no-shows. There was tentative evidence that combination treatment modalities were superior to single treatment modalities in reducing recidivism of clients with advanced drinking problems. In general, there was no evidence that either treatment or no treatment conditions differentially affected drinking-driving behavior. Experimental analyses between treatment and random control groups indicated no significant difference in recidivist arrests. However, average rearrest exposure time was only six months. A preliminary analysis of life activities (N 0 84) indicated no significant change in general health, drinking behavior, and work performance six months after initial PSI. Problem Drinker Driver Classes (PDDC) pre-post tests indicated a significant increase in knowledge and positive attitude but no change in admission of drinking problem symptoms.

by Raymond E. Reis, Jr.
South Dakota Alcohol Safety Action Proj., South Dakota Dept. of Highways, Pierre, S. Dak.; University of South Dakota, Human Factors Lab., Vermillion, S. Dak.
Contract DOT-HS-045-1-061
Rept. No. SD:ASAP-Analytic-Study-6; 1975; 284p
Subcontracted to Univ. of South Dakota.
Availability: Reference copy only

HS-802 766

SD:ASAP [SOUTH DAKOTA ALCOHOL SAFETY ACTION PROJECT] ANNUAL REPORT. JUNE 30, 1975

The South Dakota Alcohol Safety Action Proj. (ASAP) involved increased law enforcement, presentence investigations to diagnose the problem drinker driver, and public information and education campaigns concerning the drinking driver problem. The prime contracting agency was the South Dakota Dept. of Public Safety, Div. of Hwy. Safety. There was considerable contact between the State and Community Programs (402 program) and ASAP. Governmental reorganization resulted in all highway safety programs being placed within a single division, to the benefit of ASAP. The public information and education activities have included answering queries for information, and evaluations and follow-ups made using the computer facilities at the Univ. of South Dakota to computerize the data files. The implied consent statute became effective 7 Jan 1975. Equipment for pre-arrest breath testing has been used more frequently; a court challenge of its use is anticipated. Although some liquor retailers have been exerting political pressure to reduce law enforcement, public support of ASAP has been strong when such problems have been made known. Some courts have been resisting the imposition of some of the treatment and rehabilitation programs because of the attitudes of certain defense counsels. Another judicial problem has been an increase in reductions of the charges to lesser offenses. The public seems to have become more aware of the risk of apprehension if driving while intoxicated, but does not yet seem aware of the ASAP treatment programs. Trial use of radio spots and feature stories has helped. Fiscal review includes charts of overruns and underruns. Catalytic and ancillary effects of ASAP have included increased data on the problem of alcoholism and drinking while driving, and on the effectiveness of countermeasures. In addition, law enforcement agencies have been identifying more nontraffic offenses due to increased patrols.

by George I. Samis
South Dakota Alcohol Safety Action Proj., Div. of Hwy. Safety
Contract DOT-HS-045-1-061
Rept. No. SD:ASAP-Annual-Report-1975; 1975; 64p
Availability: Reference copy only

HS-802 767

SOUTH DAKOTA ALCOHOL SAFETY ACTION PROJECT. 1975 ANNUAL REPORT. APPENDIX H, TABLES

Tabulated data for the South Dakota Alcohol Safety Action Proj. (ASAP) activities in 1975 are presented on a quarterly basis. The data concern the following topics: financial and personnel; household surveys of total project impact; fatal single-vehicle, multivehicle, and pedestrian crashes; injury single-vehicle, multivehicle, and pedestrian crashes; fatal and injury crashes according to day of week and time of day; blood alcohol concentration (BAC) data for drivers killed or arrested; patrol activity; disposition of alcohol-related traffic arrests; background investigation activity; medical/psychological diagnosis and review activity; driver license record review; rehabilitation program status report; and public information and education activity.

South Dakota Alcohol Safety Action Proj., South Dakota Dept. of Highways, Pierre, S. Dak.
Contract DOT-HS-045-1-061
Rept. No. SD:ASAP-Annual-Report-1975-App-H; 1976?; 152p
Availability: Reference copy only

HS-802 768

SD:ASAP [SOUTH DAKOTA ALCOHOL SAFETY ACTION PROJECT]. FINAL REPORT, JUNE 30, 1976

The South Dakota Alcohol Safety Action Proj. (ASAP) activities involved increased law enforcement, presentence investigations to diagnose the problem drinker driver, and public information and education campaigns concerning the drinking driver problem. The prime contracting agency was the South Dakota Dept. of Public Safety, Div. of Hwy. Safety. There was considerable contact between ASAP and the State and Community Programs (402 program). Governmental reorganization resulted in all highway safety programs being placed within a single division, to the benefit of ASAP. The Management Information System has improved handling and use of data for information and evaluation. The Privacy Act precludes complete interchange of information among the various health, social services, and law enforcement agencies. ASAP helped develop procedures for administrative hearings concerning revocation and/or suspension of driver's licenses. The Breathalyzer was chosen as the preferred instrument of chemical breath testing in the field. The pre-arrest breath testing concept was tested. ASAP had not adequately anticipated the impact on the courts and prosecutors of the increased rate of arrests for driving while intoxicated. Presentence investigation and rehabilitation programs were at first resisted but then welcomed by the courts. The courts supported attendance in the Problem Drinker Driver Course more than they did assignment to treatment or rehabilitation programs. ASAP made a major breakthrough in identification and referral of the problem drinker, based on simple, objective evaluation of the individual's score on the Mortimer-Filkins interview, the blood alcohol concentration at time of arrest, and the history of arrest for alcohol-related offenses and particularly for driving while intoxicated. ASAP experience shows that the success of any such program depends on adequate public information and education. Catalytic and ancillary effects of ASAP have included establishment of traffic divisions in five of the ten participating cities, development of local programs to take over presentence investigation and rehabilitation, and improved and increased data on problem drinkers and chronic alcoholics.

by George I. Samis
South Dakota Alcohol Safety Action Proj., Div. of Hwy. Safety
Contract DOT-HS-045-1-061
Rept. No. SD:ASAP-Annual-Report-1976; 1976; 86p
Availability: Reference copy only

HS-802 769

IDENTIFICATION OF UNSAFE DRIVING ACTIONS AND RELATED COUNTERMEASURES

Accident data from a three-county area of North Carolina were analyzed to identify a set of unsafe driving acts (UDA's), determine their frequencies in accidents, in traffic citations, and in the driving population in order to calculate their relative risk factors and thus determine any differences between accident causation and enforcement priorities. The UDA's chosen included speeding, following too closely, driving left of center, running a traffic control, turning in front of oncoming traffic, and pulling in front of oncoming traffic. The mere presence of a violation in the data did not constitute a UDA; rather, the act had to be voluntarily committed. Bayes formula was used to combine accident data and exposure data to calculate relative risk factors for the UDA's, and comparisons made among them for accident frequency, relative risk, and citation frequency to determine ranking. Comparisons were also made of the profile characteristics of the drivers seen committing the various UDA's versus those who did not, and also versus the population to identify possible target groups. Turning in front of oncoming traffic was found to be the highest risk behavior, three times that of pulling in front of oncoming traffic, which ranked second. Third was following too closely; fourth was running a traffic control. Driving left of center and speeding had lower risk factors. Although speeding was the least risky behavior overall, it was the most frequently cited behavior; this indicates a mismatch between enforcement attention to violations and their relative risk. When only high speeds (70 mph) were considered, however, speeding seemed to have a very high risk. Following too closely placed first in accident frequency and third in accident risk, but was found to be very low in citation frequency. More attention should be paid to this maneuver. There does not appear to be great potential in aiming enforcement efforts at target groups; rather, attention should be focused on the unsafe act itself. Each UDA is described in terms of its dynamics, situational factors, frequency of occurrence in accidents, relative risk factor, citation frequency, driver profile, and recommendation for enforcement policy. Appended are descriptions of the 20 largest UDA categories, information on collection of citation data, the formats for both the point and trip observations which were used to record the data for computer analysis, and North Carolina's standard accident report form.

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Contract DOT-HS-5-01259
1976; 152p 2refs
Rept. for 1 Jul 1975 to 31 Dec 1976.
Availability: NTIS

HS-802 792

FAIRFAX ALCOHOL SAFETY ACTION PROJECT: TOTAL COMMUNITY INVOLVEMENT. 1972 ANNUAL REPORT

The first operational year of the Fairfax County, Va., Alcohol Safety Action Proj. (ASAP) began 1 Feb 1972 following seven months of preparatory work. Police officers were trained on a voluntary basis to learn the goals and procedures of ASAP; extra cruisers were purchased as well as two mobile vans carrying breath-testing equipment and video cameras. Law enforcement activities, which centered in the Fairfax County Police Dept., involved apprehension of those suspected of driving while intoxicated (DWI), summoning of the mobile van, testing of the suspect's breath and video taping, a pretrial interview by the Probation Office, and judicial decision whether or not to refer the individual to the ASAP program. Of those accepted into the program, social drinkers are sent to Driver Improvement classes operated by the Northern Virginia Community College and by the Fairfax County School Board, and problem drinkers are referred to the ASAP diagnostic and Psychiatric Evaluation Unit of the Fairfax-Falls Church Mental Health Center for treatment at the Center or placement in group therapy. The individual is referred back to court at the end of treatment for final disposition of the case. The ASAP probation officer does not make a recommendation for final disposition. ASAP's public information and education program included preparation of bumper stickers, coasters, buttons, and pamphlets for distribution, organization of a speakers' bu-

reau, preparation of radio spots, commercials, and posters, and preparation of counter displays on safe blood alcohol concentrations to be placed in Div. of Motor Vehicles offices and Virginia Alcoholic Beverage Commission stores. A three-hour alcohol-related curriculum unit is being field tested in the Fairfax County Schools Driver Education courses. During the first 11 months of ASAP operations, 3107 DWI arrests were made, 50% of which were classified as social drinkers and 30% as problem drinkers. The remaining 20% are an intermediate group and are being dealt with by a new program, the Fairfax Alcoholism Continuing Evaluation (FACE). Participants in the Driver Improvement Schools and in the FACE program pay to cover costs. Expenditures as of 31 Dec 1972 were 95% of that planned; planned versus actual costs are charted for each type of ASAP activity. The report contains in-depth reports of enforcement, judicial activities, rehabilitation and treatment, and public information and education programs. Statistical data by quarter are included, as are plans for the coming year.

Highway Safety Div. of Virginia, Fairfax Alcohol Safety Action Proj.
Contract DOT-HS-067-1-087
Rept. No. Annual-report-1972; 1973?; 291p
Rept. for 1 Jan-31 Dec 1972.
Availability: Reference copy only

HS-802 793

ANALYSIS OF ASAP [ALCOHOL SAFETY ACTION PROJECT] PATROL ACTIVITY. FINAL REPORT

The Fairfax County, Va., Alcohol Safety Action Proj. (ASAP) law enforcement efforts have involved special nighttime (7 P.M. to 3 A.M.) shifts staffed by overtime, specially trained regular police officers. The arrest procedure, involving administration of a breath test for blood alcohol content (BAC), averaged 60 to 80 minutes each and cost an average of $130 each. During the first 11 months of ASAP activity, total arrests for driving while intoxicated (DWI) increased by about twentyfold. The special patrols made about 35% of the DWI arrests for that Feb-Dec 1972 time period. Arrest data are tabulated by time of day and by day of week. Since most police officers received the special training, their awareness of the drunk driver carried over into regular patrol activities. They have also been encouraged to make DWI arrests because the tendency of the courts to not convict for DWI has been curbed since the onset of ASAP. All ASAP patrols also participated in emergency situations involving other crimes; the crime rate declined as a result. There has been a reduction in nonfatal crashes during the time period midnight to 4 A.M. This reduction might have been related to ASAP activities.

by Horace Wuerdemann
Highway Safety Div. of Virginia; Virginia Hwy. and Transportation Res. Council, Charlottesville, Va.
Contract DOT-HS-067-1-087
1973; 21p 9refs
Subcontracted to The Center for the Environment and Man, Inc.
Availability: Reference copy only

HS-802 794

AN EVALUATION OF THE ALCOHOL CURRICULUM USED IN THE DRIVER EDUCATION PROGRAM OF THE FAIRFAX ALCOHOL SAFETY ACTION PROJECT

The instructional package designed for high school use by the Fairfax County, Va., Alcohol Safety Action Proj. (ASAP) was evaluated according to how well it isolated its target audience and behaviors and how well it motivated its audience. The package consists of a manual and audiovisual materials; it is a three-hour program. The experimental group used the curriculum in an ASAP area; the three control groups used a programmed text, a teacher with different materials, and a teacher with different materials in an ASAP area, respectively. Results show that the Fairfax Alcohol Instructional Package was at least as effective as the traditional program in imparting knowledge to driver education students and may have been significantly more effective. Other important influences on student progress were shown to be the quality and personality of the teacher, and the overall influence of ASAP in the ASAP area.

by Cheryl W. Lynn
Highway Safety Div. of Virginia; Virginia Hwy. and Transportation Res. Council, Charlottesville, Va.
Contract DOT-HS-067-1-087
1974; 15p 17refs
Subcontracted to the Virginia Hwy. and Transportation Res. Council.
Availability: Reference copy only

HS-802 795

FAIRFAX ALCOHOL SAFETY ACTION PROJECT: 1974 ANNUAL REPORT

Impact of the Fairfax County, Va., Alcohol Safety Action Proj. (ASAP), which became operational in Feb 1972, was assessed by examining data on fatal crashes, fatalities, injury crashes, and property crashes for 1972, 1973, and 1974, and by comparison of actual crash data with predictions made by analysis of statistical trends and projections. Fatal crashes and fatalities have been steadily reduced during the years of ASAP operation: from 100 in 1971 to 62 in 1974. Actual number of injury crashes is well below the projected number. Comparative data for fatal, personal injury, and property damage accidents are tabulated. Results of roadside surveys measuring the percentage of legally intoxicated drivers in nighttime samples show that there has been a 35% decrease since the baseline survey. Expenditures were close to the planned budget. Specific reports are included for enforcement, judicial, rehabilitation, and public information and education activities. A cost/benefit analysis was made which showed that benefits exceeded costs by at least 1.6 to 1 up to 12 to 1. Appended are tabulated data.

Highway Safety Div. of Virginia, Fairfax Alcohol Safety Action Proj.
Contract DOT-HS-067-1-087
Rept. No. Annual-report-1974; 1975?; 189p
Availability: Reference copy only

HS-802 796

TRENDS IN PUBLIC INFORMATION AND AWARENESS OF ASAP AND THE DRINKING DRIVING PROBLEM. INTERIM REPORT

Impact of the Fairfax County, Va., Alcohol Safety Action Proj. (ASAP) was evaluated by comparative analysis of household surveys which determined factual knowledge of intoxication, awareness of ASAP or any similar program, and awareness of the drunk driver problem. A baseline survey was conducted in 1971, and annual surveys thereafter through 1974. Improvements were noted in the following areas: percentage of respondents correctly estimating that a small person gets drunk faster than a large person; percentage who knew that strong black coffee does not help a person to sober up; and percentage who thought that their chances of getting stopped by the police when driving after drinking were better than even. There were significant decreases in the percentage of respondents who had heard of a campaign or program to reduce alcohol-related deaths and in the percentage of those who knew that more fatal accidents are caused by problem drinkers than by social drinkers. Respondents preferred by far having more severe penalties for convicted drunk drivers.

by Thomas J. Smith
Highway Safety Div. of Virginia; Virginia Hwy. and Transportation Res. Council, Charlottesville, Va.
Contract DOT-HS-067-1-087
1975; 16p 5refs
Subcontracted to the Virginia Hwy. and Transportation Res. Council.
Availability: Reference copy only

HS-802 797

DIAGNOSIS, REFERRAL AND REHABILITATION WITHIN THE FAIRFAX ALCOHOL SAFETY ACTION PROJECT, 1974. FINAL REPORT

The Fairfax County, Va., Alcohol Safety Action Proj. (ASAP) subsystems concerning diagnosis, rehabilitation, and referral are statistically described. Distributions of demographic and alcohol-related variables are compared in relation to drinker type, treatment referral, rehabilitation status (complete vs. drop) and recidivism. A multiple discriminant function analysis was performed which yielded a less than comprehensive function for discriminating between drinker classifications, and a more complete function discriminating among referrals. The increased discriminability among referrals is due to the strong influence made upon the referral decision by the drinker diagnosis which was entered as an additional variable. Crash involvement and recidivism rates for various drinker types and treatment referrals were generated. Recidivism rates for persons not referred to treatment are significantly higher than rates for those persons who were referred. There are no differences in rates for modalities when controlling for drinker type and exposure. Knowledge scores for persons attending the various modalities which make up treatment Type I, alcohol related driver education, were examined. This analysis yielded results similar to previous findings concerning Driver Improvement Schools (DIS) knowledge scores in all respects except one: in 1974, the Weekend Driver Improvement Schools imparted knowledge to students at least as effectively as the nonweekend programs.

by Cheryl Lynn
Highway Safety Div. of Virginia; Virginia Hwy. and Transportation Res. Council, Charlottesville, Va.
Contract DOT-HS-067-1-087
Rept. No. Analytic-study-5; Analytic-study-6; 1975; 81p 1ref
Subcontracted to the Virginia Hwy. and Transportation Res. Council.
Availability: Reference copy only

HS-802 798

DRINKING-DRIVING KNOWLEDGE, ATTITUDES, AND BEHAVIOR: AN ANALYSIS OF THE 1973 AND 1974 HOUSEHOLD SURVEYS OF THE FAIRFAX ALCOHOL SAFETY ACTION PROJECT

Impact of the Fairfax County, Va., Alcohol Safety Action Proj. (ASAP) public education and information program was studied by comparative analysis of the 1973 and 1974 household surveys which determined factual knowledge of intoxication, attitudes concerning drinking drivers, drinking and driving behavior, and awareness of drunk driving countermeasures. There was a decrease in identifying the problem drinker as the cause of more fatal traffic accidents, and in giving an at least partially correct definition of the term blood alcohol level. Only 68% correctly responded to questions on factual knowledge related to the effects of alcohol; the percentage was the same as in the 1973 survey. There was a generally healthy estimate of the risks involved in driving while under the influence of alcohol; perceived risk was high, but the percentage did not change from the 1973 survey. There was no change in attitude toward use of rehabilitation measures in dealing with drunk drivers. There was a small decrease in favoring jail sentences and there was an increase in favoring fines as a means of dealing with drunk drivers. The total amount of driving reported decreased slightly, and driving after drinking increased. There was no significant change in the pattern of drinking behavior. Few respondents reported that they were aware of the existence of ASAP or any similar program. The public information and education efforts of ASAP during the year preceding the 1974 survey are thus shown to be ineffectual. Survey data are appended.

by Arthur N. Beare
Highway Safety Div. of Virginia; Virginia Hwy. and Transportation Res. Council, Charlottesville, Va.
Contract DOT-HS-067-1-087
Rept. No. VHTRC-75-R15; 1975; 54p
Subcontracted to the Virginia Hwy. and Transportation Res. Council.
Availability: Reference copy only

HS-802 799

AN ANALYSIS OF ULTIMATE PERFORMANCE MEASURES TO DETERMINE TOTAL PROJECT IMPACT OF THE FAIRFAX ALCOHOL SAFETY ACTION PROJECT. PROGRESS REPORT NO. 3

Impact of the Fairfax County, Va., Alcohol Safety Action Proj. (ASAP) was studied at the end of its third operational year (1974) by consideration of such ultimate performance measures as number of injuries, number of crashes, and average blood alcohol content (BAC) of drivers. There was a

definite reduction in the number of personal injuries, fatal injuries, and fatal crashes from what would have been predicted by linear regression analysis based on trends established over the past 15 years; the change is significant at the 95% level. The effects of other influences on the data, such as the energy shortage, were compensated for. Average BAC's of drivers in the ASAP area showed little change during the 1972-1974 period: 1973 mean BAC for alcohol-related fatalities was 0.148%; in 1974, it was 0.159%. The average number of fatally injured drivers with positive BAC's was higher for the three years of ASAP operations than it was for the baseline period (16.7 to 13.7), while the average number of fatalities with positive BAC's was the same for both periods. The average BAC level for drivers arrested for driving while intoxicated (DWI) but not involved in crashes declined from 0.19% in 1972 to 0.17% in 1973 and then increased to 0.18% in 1974. When the 1972 change in the presumptive level of intoxication of from .15% to .10% is taken into consideration, a statistically significant change in the BAC level is seen. The benefit/cost analysis of the Fairfax ASAP indicates that the project may be returning benefits at a rate of 1.6 to 1 and 12 to 1 over projected costs at the 95% confidence level. Estimated cost savings after three years of operations appear to be between $4 and $29 million. Two confounding factors in the analysis were the extraordinarily high number of fatal crashes in 1971 and the effects of the energy shortage, including the nationwide 55 mph speed limit. The control area used for comparison of data was Henrico County, Va. Statistical data are appended.

by Jeffrey A. Spencer; Wayne S. Ferguson
Highway Safety Div. of Virginia; Virginia Hwy. and Transportation Res. Council, Charlottesville, Va.
Contract DOT-HS-067-1-087
Rept. No. PR-3; 1975; 62p
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Availability: Reference copy only

HS-802 800

DIAGNOSIS, REFERRAL, AND REHABILITATION WITHIN THE FAIRFAX ALCOHOL SAFETY ACTION PROJECT, 1975

The Fairfax County, Va., Alcohol Safety Action Proj. (ASAP) diagnosis, referral, and rehabilitation system is described both in narrative form and by descriptive statistics for 1975. Persons arrested for drunk driving are classified as social drinkers, potential problem drinkers, or problem drinkers. Types of rehabilitation include the following: for alcohol related driver education, the Driver Improvement Schools; for alcohol education and information, such programs as the Fairfax Alcohol Community Education (FACE), the Washington Hospital Center's Participating Personal Education (PPE), Fairfax County's Alcohol Orientation Communication (AOC), military programs such as the Army's ADCO and Headway, the Social Actions Program of the Air Force and the Navy's AACP, programs including Keystone's Youth Options Program and those offered by local Div. of Alcohol Services Clinics; for treatment of problem drinkers, alcohol treatment clinics; for diagnostic, evaluation and mental health services, clinics offering group intake, individual and group rehabilitation and women's groups. Specialized programs include inpatient care, detoxification and vocational counseling, and Power Motivation Training. Defendants in the three drunk driving (DUI) categories entering ASAP in 1975 are classified by age, sex, race, marital status, education, occupation, income, blood alcohol content at time of arrest, and number of DUI offenses, speed violations and criminal offenses. Program referrals, including for short term rehabilitation (STR), are classified by drinker type. An interdiagnostician reliability check elicited significant differences of diagnosis in two of the drinker levels. The cost efficiency of the diagnosis, referral, probation followup, and rehabilitation systems is examined by comparing anticipated versus actual costs. Two in-process studies of the ASAP rehabilitation system are discussed: Recidivism/Crash Involvement and Life Change. Results of these studies will be presented in the 1976 Analytic Report No. 6.

by David N. Saunders; Linda J. Pemberton
Highway Safety Div. of Virginia; Virginia Commonwealth Univ., School of Social Work, Richmond, Va.
Contract DOT-HS-067-1-087
1976; 104p
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Availability: Reference copy only

HS-802 801

TRENDS IN PUBLIC INFORMATION WITHIN THE FAIRFAX ALCOHOL SAFETY ACTION PROJECT, 1975

Impact of the Fairfax County, Va., Alcohol Safety Action Proj. (ASAP) was studied by comparative analysis of roadside and telephone surveys conducted 1971-1975 to measure awareness of alcohol and alcohol countermeasures, knowledge of drinking and driving, attitudes toward coping with drunken drivers, and behavior of bystanders in relation to drunken drivers. The Fairfax community's awareness of both alcohol programs in general and the ASAP in particular have declined since 1974. Those who had prior alcohol experience, those who drove, and those who currently drank were more aware of alcohol and related countermeasures than were other groups. While knowledge of drinking and driving had increased over baseline levels, it was not as high as during the midyear of the project. Meaningful numbers of respondents were not able to answer questions correctly, especially in terms of the blood alcohol concentration necessary for a presumption of driving while intoxicated and the number of drinks necessary to reach that limit. There was a significant decline in positive attitudes toward coping with drunk drivers over the last six months of 1975; the most significant decreases in likelihood of using recommended techniques to avert drunk driving occurred among socially oriented party behaviors. There was significantly less likelihood of supporting increased police enforcement and more severe penalties for drunk drivers. As awareness levels increased, however, attitudes became more positive. A majority of respondents who had been in a situation in which a friend had been drinking too heavily and was about to drive a car had actually stopped the driver. There was no significant difference in percentages of respondents reporting this type of behavior across surveys. There is little evidence to indicate that the public information program was effective in increasing its awareness, overall knowledge, or in improving attitudes toward drunk driving. Both levels of awareness and the positiveness of attitudes were on the decline in 1975.

by Cheryl W. Lynn
Highway Safety Div. of Virginia; Virginia Hwy. and Transportation Res. Council, Charlottesville, Va.
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Rept. No. VHTRC-76-R; 1976; 39p
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HS-802 802

DRINKING-DRIVING ATTITUDES, KNOWLEDGE AND BEHAVIOR: AN ANALYSIS OF THE FIRST TWO TELEPHONE SURVEYS OF THE FAIRFAX ALCOHOL SAFETY ACTION PROJECT. FINAL REPORT

Impact of the Fairfax County, Va., Alcohol Safety Action Proj. (ASAP) public information and education program was studied by comparative analysis of two telephone surveys conducted Jun and Dec 1975. During each, 500 ASAP area residents randomly selected from the Northern Virginia phone book were called and were interviewed using a standard questionnaire. The sample was stratified by sex and partially by age. Differences between survey results were examined through the analysis of individual items and through the construction of four composite scales. The variables measured by these scales included alcohol experience, alcohol awareness, attitudes toward coping with drunk driving, and alcohol-related behavior. The two sets of survey respondents were similar in their demographic characteristics, their previous experience with alcohol, and their alcohol behavior. The groups were not significantly different in their overall alcohol awareness, although there was a slight decline in this scale across time and a marked decline in some individual items, such as specific awareness of the ASAP. There were also significant declines in positive attitudes toward handling drinking drivers. There is no evidence that the Fairfax public information and education program has been successful in disseminating information on the existence of the ASAP locally or in improving support for countermeasure activities. Additionally, there is no evidence that the national campaigns have been effective with the main thrust of the campaigns, that is, changing attitudes toward bystander intervention in drunk driving. Appended are a sample survey form and answer coding sheet, and description of how the numerical scales were constructed.

by Cheryl Lynn
Highway Safety Div. of Virginia; Virginia Hwy. and Transportation Res. Council, Charlottesville, Va.
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Availability: Reference copy only

HS-802 803

TRENDS IN DRINKING-DRIVING AT NIGHT. A COMPARISON OF THE FIRST FIVE ROADSIDE SURVEYS OF THE FAIRFAX ALCOHOL SAFETY ACTION PROJECT. FINAL REPORT

Impact of the Fairfax County, Va., Alcohol Safety Action Proj. (ASAP) was measured by comparative analysis of five roadside surveys which gathered demographic data of drivers, blood alcohol concentrations (BAC's) of nighttime drivers, drinking habits of the drivers, and their knowledge of drinking and driving. The baseline survey was conducted in Jan 1972; the four subsequent surveys in Oct of 1972-1975. Findings must be considered in light of the significant differences in the demographic characteristics of the fifth sample respondents from the baseline sample respondents, and in light of the fact that the fifth sample included larger percentages of weekend and nighttime interviews. The distribution of BAC's changed significantly over time: on the fifth survey, proportionally fewer respondents registered negative BAC's while a larger proportion registered high BAC's. The largest increase in BAC levels occurred during the time period 12:40 A.M. to 3:00 A.M. and among white males in the age ranges 20-39 or 50-59 years. Increases were equally distributed among residents and nonresidents of the ASAP area, although those who had resided in the county for a longer period of time tended to have lower BAC's. In terms of accident potential, both the estimated numbers of drunken drivers passing the interview site and the frequency with which a vehicle would meet drunken drivers increased with time and were higher for the fifth survey than during any previous one; these statements are also true of accident probability. Accident potentials have risen along with average BAC levels in spite of the efforts of the ASAP. While drinking in general and drinking during the two-year period preceding the administration of the survey questionnaire increased significantly, driver perception of drinking status shifted toward the less serious categories. The percentage of respondents who could correctly define blood alcohol concentration was found to have increased; knowledge of the presumptive limit for drunk driving decreased slightly. Only 9.2% were able to estimate correctly the number of drinks necessary to achieve a BAC of .10% or over. Respondents who were drinking but who were not over the legal limit scored higher on overall alcohol knowledge than did nondrinkers in the survey or those who were over the legal BAC. ASAP area residents did not score any differently than did nonresidents in terms of knowledge of drunk driving.

by Cheryl Lynn
Highway Safety Div. of Virginia; Virginia Hwy. and Transportation Res. Council, Charlottesville, Va.
Contract DOT-HS-067-1-087
Rept. No. VHTRC-77-R1; 1976; 65p 4refs
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Availability: Reference copy only

HS-802 804

AN ANALYSIS OF ULTIMATE PERFORMANCE MEASURES TO DETERMINE TOTAL PROJECT IMPACT OF THE FAIRFAX ALCOHOL SAFETY ACTION PROJECT

Impact of the Fairfax County, Va., Alcohol Safety Action Proj. (ASAP) was studied at the end of its fourth year, 1975, by such ultimate performance measures as fatalities, injuries, and property-damage crashes, average blood alcohol concentration (BAC) of drivers in the ASAP area, and average BAC's for drivers arrested for driving while intoxicated (DWI) but not involved in crashes. There was a significant decrease in the number of personal injuries, personal injury crashes, fatal injuries, fatal injury crashes, and property damage crashes from what would have been predicted by linear regression analysis based upon trends established over the past ten years; the changes are significant at the 95% confidence level. The mean BAC of drivers in the ASAP area for 1975 was .126%, compared with .148% average for the previous six years. The average number of fatally injured drivers with positive BAC's during the 1972-1975 operational period was virtually identical to the pre-ASAP average. The average BAC's for drivers arrested for driving DWI but not involved in crashes declined from .19% in 1972 to .16% in 1975. When the 1972 change in the presumptive level of intoxication of from .15% to .10% is taken into consideration, a statistically significant change in the BAC is seen. A benefit/cost analysis shows that the actual

societal costs of Fairfax County accidents during 1975 were significantly lower than those projected on the basis of pre-ASAP trends: savings were $3 to $12 million in 1975. Two confounding factors in the analysis were the extraordinarily high number of fatal crashes in 1971 and the effects of the energy shortage, including the nationwide 55 mph speed limit. The control area used for comparison of data was Henrico County, Va.

by Jeffrey A. Spencer
Highway Safety Div. of Virginia; Virginia Hwy. and Transportation Res. Council, Charlottesville, Va.
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HS-802 829

VEHICLE INTEGRATION AND EVALUATION OF ADVANCED RESTRAINT SYSTEMS. PHASE A - TEST REPORT. VOLVO-TO-VOLVO, VOLVO-TO-BARRIER TESTS

Nine impact tests were performed with Volvo 244's in car-to-car and car-to-barrier configurations to test the Research Safety Vehicle (RSV) driver restraint system, the RSV passenger airbag system, the force-limited airbelt, and the force-limited two-inch belt. The car-to-car tests (head-on and offset right and left) were performed with closing speeds of from 80.6 to 89.8 mph, both cars moving at the same speed; the barrier impact test speeds ranged from 46.1 to 48.3 mph. In the majority of the tests the RSV driver airbag and the RSV passenger airbag were installed in one car and the force-limited air belt and force-limited two-inch belt in the second. Both were treated as passenger restraint systems, i.e. no steering column at either position. The vehicles were structurally modified to provide mounting hardware for the restraint systems and to retain the structural integrity of the occupant compartment, particularly in the cowling region. For each test, impact conditions and vehicle modifications are described, and tabulated summaries are given of vehicle data, injury criteria data, restraint system data, and occupant response data. Data gathered included peak G's for head, chest, and femurs, and velocity change in mph.

Dynamic Science Inc., 1850 W. Pinnacle Peak Rd., Phoenix, Ariz. 85027
Contract DOT-HS-6-01307
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HS-802 830

VEHICLE INTEGRATION AND EVALUATION OF ADVANCED RESTRAINT SYSTEMS. PHASE B - TEST REPORT. TORINO-TO-VOLVO TESTS

Eight impact tests were conducted with Volvo 244's as impact vehicles and Ford Torinos as bullet vehicles to test the Research Safety Vehicle (RSV) driving restraint system, the RSV passenger airbag system, the force-limited airbelt, and the force-limited two-inch belt. The Torino-to-Volvo impacts were head-on and at angles ranging from zero to 45°. Impact speeds ranged from 59.5 to 78.6 mph. The RSV driver and passenger airbags were installed together in one test vehicle and the force limited airbelt and force limited two-inch belt in the second. Both were treated as passenger restraint systems, i.e. no steering column at either position. The vehicles were structurally modified to provide mounting hardware for the restraint systems and to retain the structural integrity of the occupant compartment, particularly in the cowling region. For each test, impact conditions and vehicle modifications are described, and tabulated summaries are given of vehicle data, injury criteria data, restraint system data, and occupant response data. Data gathered included peak G's for head, chest, and femurs, and velocity change in mph.

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Jack Faucett Associates, 5454 Wisconsin Ave., Chevy Chase, Md. 20015; System Design Concepts, Inc., One Farragut Square So., Washington, D.C. 20006
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Dynamic Science Inc., 1850 W. Pinnacle Peak Rd., Phoenix, Ariz. 85027
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Boston Alcohol Safety Action Proj., Rehabilitation Evaluation Staff, 211 Congress St., Boston, Mass. 02110
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Avco Systems Div., 201 Lowell St., Wilmington, Mass. 01887
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University of North Carolina, Hwy. Safety Res. Center, Chapel Hill, N.C. 27514
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Adaptronics, Inc., Westgate Res. Park, 7700 Old Springhouse Rd., McLean, Va. 22101
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Stanford Univ., Dept. of Mechanical Engineering, Stanford, Calif. 94305
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H. H. Aerospace Design Co., Inc., Civil Air Terminal, Bedford, Mass. 01730
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Environmental Impact Center, Inc., 55 Chapel St., Newton, Mass. 02158
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CONTRACTS AWARDED

DOT-HS-7-01672

LORAN-C FEASIBILITY DEMONSTRATION PLAN

The LORAN-C feasibility demonstration plan shall be implemented. Additions to the Program Planning Agreement (PPA OS-789) shall be supported as follows: demonstrate LORAN-C potential under simulated normal state/local operational conditions for traffic safety oriented applications, to determine the acceptability of a LORAN-C system to potential users; to achieve desired National Highway Traffic Safety Administration (NHTSA) objectives, by placing emphasis on both LORAN-C precise positioning techniques, as well as automatic vehicle monitoring (AVM) as applicable to EMS (emergency medical service), PTS (Police Traffic Services), Traffic Records, etc.; provide software packages required for demonstration tasks cited above; prepare the initial draft, and in consultation with representatives from NHTSA/FHWA (Federal Highway Administration/OST (Office of Secretary of Transportation)), the final preparation of the LORAN-C Demonstration Contract with the State of New York; prepare a sole source justification; and act as Contract Technical Manager with active participation by technical representatives from NHTSA/FHWA/OST, in the joint LORAN-C Demonstration Project with a State Government.

U.S. Department of Transportation, Transportation Systems Center, Kendall Square, Cambridge, MA 02142
$175,000.00
FY 1977.

DOT-HS-7-01673

TIME SHARING SERVICES - BOX JENKINS - TIME SERIES ANALYSIS

Interactive time-sharing services shall be furnished for time series analysis computations which shall be based upon the National Highway Traffic Safety Administration's (NHTSA) need for use in evaluation of demonstration projects.

National CSS, Inc., 542 Westport Avenue, Norwalk, Connecticut 06851
$15,000.00
To be completed by 30 Sep 1977.

DOT-HS-7-01674

EVALUATION METHODOLOGY FOR THREE FEDERAL MOTOR VEHICLE SAFETY STANDARDS

Methodologies shall be studied and detailed plans shall be developed for the field evaluation of three (3) Federal Motor Vehicle Safety Standards (FMVSS), FMVSS No. 105 (Hydraulic Brake Systems - Passenger Cars), FMVSS No. 108 (Lamps, Reflective Devices and Associated Equipment (only concerned with side marker lamps for this contract)), and FMVSS No. 122 (Motorcycle Brake Systems). The evaluation of the standards will focus on the following two items: measuring the real-world performance of the standard so as to adjust, refine, revise or eliminate performance requirements; and measuring the extent to which accident frequency and severity are reduced by each standard and comparing these benefits to the actual costs to the consumer as a result of the standard's promulgation. 0 Tr

The Center for the Environment and Man, Inc., 275 Windsor Street, Hartford, Connecticut 06120
$93,262.00
To be completed six (6) months from date of contract award (2 Aug 77).

DOT-HS-7-01675

EVALUATION METHODOLOGY FOR SIX FEDERAL MOTOR VEHICLE SAFETY STANDARDS

Methodologies shall be studied and detailed plans shall be developed for the field evaluation of six (6) Federal Motor Vehicle Safety Standards (FMVSS), FMVSS No. 202 (Head Restraints), FMVSS No. 207 (Seating Systems), FMVSS No. 213 (Child Seating Systems), FMVSS No. 220 (School Bus Rollover Protection), FMVSS No. 221 (School Bus Body Joint Strength), and FMVSS No. 222 (School Bus Seating and Crash Protection). The evaluation of the standards will focus on the following two items: measuring the real-world performance of the standard so as to adjust, refine, revise or eliminate performance requirements; measuring the extent to which accident frequency and severity are reduced by each standard and comparing these benefits to the actual costs to the consumer as a result of the standard's promulgation.

The Center for the Environment and Man, Incorporated, 275 Windsor Street, Hartford, Connecticut 06120
$97,822.00
To be completed six (6) months from date of contract award (2 Aug 77).

DOT-HS-7-01676

PURCHASE OF 3500 ARMSTRONG SURVEYOR 78, BIAS PLY POLYESTER G78-15 BLACKWALL TIRES, CATALOGUE NO. 144045

Thirty-five hundred (3500) Armstrong Surveyor 78, Bias Ply Polyester G78-15 Blackwall Tires, Catalogue No. 144045 with Special Quality Control (Uniform Tire Quality Grading) shall be manufactured to obtain the objective of minimal variation in tread wear.

Armstrong Rubber Company, 500 Sargent Drive, New Haven, Connecticut 06507
$139,440.00
To be completed four (4) months from date of contract award (18 Sep 77).

DOT-HS-7-01677

PURCHASE OF 2500 BIAS BELTED TREADWEAR COURSE MONITORING TIRES (CMT'S) WITH SPECIAL QUALITY (UTQG)

Twenty-five hundred (2500) General Belted Jumbo 780, G78-15 Bias Fiberglass Belted, Polyester Blackwall Tires, to the

specification for Quality Control (Uniform Tire Quality Grading (UTQG)) shall be manufactured. 0he

General Tire and Rubber Company, One General Street, Akron, Ohio 44323
$97,650.00
To be completed four (4) months from date of contract award (8 Aug 77).

DOT-HS-7-01680

HYDRAULIC BRAKE SYSTEMS

Hydraulic brake systems shall be tested in accordance with FMVSS No. 105-75 (National Highway Traffic Safety Administration's (NHTSA) Office of Standards Enforcement (OSE) Laboratory Test Procedure TP-105-75-02 dated February 1977 in sections 1 through 10, 12, 13, 15, and 16).

North American Testing Company, 1801 Speedway Boulevard, Post Office Drawer S, Daytona Beach, Florida 32015
Per Delivery Order
To be completed one (1) year from date of contract award (10 Aug 77).

DOT-HS-7-01681

HYDRAULIC BRAKE SYSTEMS

Hydraulic brake systems shall be tested in accordance with FMVSS No. 105-75 (National Highway Traffic Safety Administration's (NHTSA) Office of Standards Enforcement (OSE) Laboratory Test Procedure TP-105-75-02 dated February 1977 in sections 1 through 10, 12, 13, 15, and 16).0ugh

Dynamic Science, Inc., 1850 West Pinnacle Peak Road, Phoenix, Arizona 85027
Per Delivery Order
To be completed one (1) year from date of contract award (10 Aug 77).

DOT-HS-7-01682

AUTOMOTIVE FUEL ECONOMY TRAINING PROGRAM

The work required to conduct a course in Automotive Fuel Economy shall be performed. The first task is to develop a program of instruction in certain topics (engine thermodynamics, vehicle power plant design, automobile manufacturing and marketing economics, automotive fuel economy, fuel production and sources, Environmental Protection Agency (EPA) vehicle test procedures), at an instructional level equivalent to post-graduate work. The program will be aimed for senior engineers, economists, and managers with experience in government and industry. A general introduction to each topic followed by an in-depth analysis of the most recent trend and developments is suggested as being the most useful approach. An evaluation scheme is to be included as part of the program and will assess the program's worth to participants and the National Highway Traffic Safety Administration's (NHTSA) Office of Automotive Fuel Economy (NFE). The second task is to implement the instructional program which has been developed. The third task is to prepare a final report which shall consist of two documents containing the following information: the program of instruction in a form usable by other groups to reproduce the training; and an evaluation of the program, noting its effectiveness in meeting the objectives with any recommendations for improvement of this type of program.

University of Maryland, University College, Conferences and Institute Division, College Park, Maryland 20742
$15,215.00
To be completed by 30 Nov 77.

DOT-HS-7-01683

STATES REVIEW OF RESEARCH AND DEMONSTRATION PROGRAMS

Support shall be given the National Highway Traffic Safety Administration (NHTSA) in continuing its program of involvement with the states which was conducted in the past year and which included a survey and comments on the research and demonstration activities concerning highway safety that are carried out at the Federal level. Materials shall be selected to distribute to the states which explain the planning process of the research and demonstration program, proposed programs, program justification, other background materials, and to detail what response is desired from the states. Included will be a proposed survey instrument. NHTSA will distribute the materials and the survey instruments to the states and other respondents. The contractor will analyze survey responses and provide timely summaries of states that have responded so that follow-up can be conducted to insure maximum participation.

"This contract is awarded by the Small Business Administration under the authority of Section 8(a) of the Small Business Act (USC 637a), and will be administered by the Department of Transportation, National Highway Traffic Safety Administration."
$39,676.00
To be completed by 15 Jan 78.

DOT-HS-7-01685

DESIGN OF NATIONAL EXPOSURE DATA SYSTEM

A design shall be developed for a practical, cost feasible system which will provide nationally valid exposure data on the nation's motor vehicle travel which can be used to complement the accident data to be collected under the NASS (National Accident Sampling System). It is necessary for the National Highway Traffic Safety Administration (NHTSA) to have "adequate" statistical data on motor vehicle accidents in order to properly develop, implement, and evaluate safety programs such as the Motor Vehicle Safety Standards and the Highway Safety Standards. To a large extent, this contract will involve a careful evaluation and synthesis of selected previous research in motor vehicle exposure and research on the design and subsequent implementation of the NASS. Emphasis shall be placed on the consideration and evaluation of several alternative system designs to meet this objective. 0 an

The University of Michigan, Division of Research Development and Administration, Research Administration Bldg. - North Campus, Ann Arbor, Michigan 48105
$62,500.00
To be completed by 9 Aug 78.

DOT-HS-7-01690

ACCIDENT CAUSATION METHODOLOGY DEVELOPMENT FOR THE NATIONAL ACCIDENT SAMPLING SYSTEM (NASS)

An accident causation methodology shall be developed for the National Accident Sampling System (NASS), a system which provides the accident data which are required by the National Highway Traffic Safety Administration (NHTSA) in its primary mission to reduce the number of fatalities and injuries and the economic loss resulting from motor vehicle accidents on the nation's roads and highways. Basically, the objectives of this contract are as follows: develop a methodology which will provide maximum information on the causes of accidents and which can be implemented via the NASS concept; determine a representative set of questions that can be answered in the accident causation area (with a specified precision and accuracy) within the various subsystems of NASS, i.e., the Continuous Sampling and Special Study Subsystems; perform a limited, in-the-field, test of the methodologies developed utilizing one or more of the NASS pilot teams; and to provide guidelines, information on training, and procedures for the implementation of the methodology(ies) by the NASS teams.

Indiana University Foundation, 355 North Lansing Street, Indianapolis, Indiana 46202
$145,098.00
To be completed twelve (12) months from date of contract award (28 Sep 77).

DOT-HS-7-01691

SUPPPORT FOR ANALYTICAL TOOLS FOR AUTOMOTIVE FUEL ECONOMY ACTIVITIES

Programming, analytical support and training in the use of analytical tools shall be provided to the National Highway Traffic Safety Administration (NHTSA) for its Automotive Fuel Economy Activities. In the determination of technological feasibility, economical practicability, the effects of motor vehicle standards on fuel economy, and the nation's need to conserve energy, NHTSA has employed in its research and analysis analytical tools, accounting models, and data bases for assessment of automotive technology, automotive industry analysis, economic and marketing analysis and integrated analysis. It is the objective of this contract to train personnel of the Energy Research Division and the Office of Automotive Fuel Economy in the use of these assessment tools, to provide documentation and user manuals for their description and use as required, to provide capability for minor programming, and to perform analysis and to utilize the assessment tools as required by the Office of Automotive Fuel Economy and Energy Research Division in support of Automotive Fuel Economy Activities.

"This contract is awarded by the Small Business Administration under the authority of Section 8(a) of the Small Business Act (USC 637a), and will be administered by the Department of Transportation, National Highway Traffic Safety Administration."
$46,056.45
To be completed twelve (12) months from date of contract award (6 Sep 77).

DOT-HS-7-01693

TIRE INSPECTION MACHINE COMPLETION AND VALIDATION

The completion and validation of a prototype tire inspection machine which is being developed at Southwest Research Institute for the National Highway Traffic Safety Administration (NHTSA) shall be accomplished. The tire inspection machine will have the capabilities of automatically inspecting tire tread depth, tire inflation pressure and tire carcass integrity. So far the machine has been developed to meet all the goals except the capability of vehicle tire inspection in a vehicle inspection station environment. Further machine development and refinement are required to complete the inspection machine development. The objectives of this contract are to complete the development of the machine to the point of full-scale inspection station capability, and to validate the machine by inspecting tires with known defects.0o t

Southwest Research Institute, 8500 Culebra Road, San Antonio, Texas 78284
$234,710.00
To be completed fourteen (14) months from date of contract award (28 Sep 77).

DOT-HS-7-01697

STANDARDS DEVELOPMENT AND QUALIFICATION TESTING FOR SPEED MEASURING DEVICES

The development and issuance of product standards devices used for measuring vehicle speeds for law enforcement purposes and the testing of such devices shall be accomplished The National Highway Traffic Safety Administratio (NHTSA) has a particular interest in speed-measuring device (SMD's) which has become especially critical since the enact ment of the 55-mph National Maximum Speed Law (NMSL). Accurate and reliable SMD's are required to determine compliance with this law. This contract will concern the following major areas: inventory of data on existing SMD's for law enforcement purposes (to include, but not be limited to, manufacturers' specifications of make and model, testing procedures, warranties, maintenance requirements); specification of the field operational characteristics associated with the various SMD's (how device is used in the field, accuracy requirements for court evidence, etc.); development of performance standards for the various types of SMD's (to include, but not be limited to, requirements and methods of test for precision, accuracy, and safety); compliance testing (to include testing commercially available SMD's to determine whether they comply with the standards developed); and publication of results of preceding tasks (to include the issuance of a "Qualified Products List" for each type of speed-measuring device).0ant

Law Enforcement Standards Laboratory, Building 221 -- Room B150, National Bureau of Standards, Washington, D.C. 20234
$339,000.00
To be completed thirty-six (36) months from date of contract award (29 Sep 77).

DOT-HS-7-01698

ANALYSIS OF STATE ROAD TEST EXAMINATIONS

An analysis shall be made of the state road test examinations which are administered in driver licensing and regulation activities. The purpose of this contract is to define the role of road test examinations as performed by the states. The contract is designed to provide a literature review, a conference, and a final report synthesizing the characteristics of performance testing, current status, recommendations for its use, and means for resolving the issues concerning the validity of all forms of knowledge and performance testing of drivers in screening, diagnosing, and instructing applications.

Highway Safety Research Center, University of North Carolina, Trailer 13, CTP 197A, Chapel Hill, North Carolina 27514
$48,833.00
To be completed five (5) months from date of contract award (15 Sep 77).

DOT-HS-7-01701

VISCOUS FLOW CRASH RECORDERS AND SENSORS

One hundred (100) self-contained, calibrated crash recorders (Ref: Breed Corp. Dwg 509935) and twenty (20) differential velocity crash sensors (Ref: Breed Corp. Dwg 510256) shall be furnished. The crash sensors are to be preset for 10.5 mph deltaV. The delivered package is to include brief instructions for the mounting and use of the recorders/sensors.

Breed Corporation, 20 Spielman Road, Fairfield, New Jersey 07006
$18,000.00
To be completed fourteen (14) weeks from date of contract award (22 Sep 77).

DOT-HS-7-01705

WINDSHIELD WIPING AND WASHING SYSTEMS--OTHER THAN PASSENGER CARS

Windshield wiping and washing systems (other than those of passenger cars) shall be tested in compliance with FMVSS No. 104-04 (National Highway Traffic Safety Administration's (NHTSA) Office of Standards Enforcement (OSE) Laboratory Test Procedure TP-104-04 dated September 16, 1974). The following exceptions to the test procedure will be made: delete steps 6.4.2.2 through 6.4.2.10 (a method for determining windshield layouts); conduct step 6.4.2.18 using layouts supplied by NHTSA; and delete paragraphs 6.6, 6.7, 6.8, 6.9, and 6.10 of the test procedure.

Dayton T. Brown, Inc., Church Street, Bohemia, New York 11716
Per Delivery Order
To be completed one (1) year from date of contract award (31 Aug 77).

DOT-HS-7-01706

NATIONAL ACCIDENT SAMPLING SYSTEM SAMPLE DESIGN, PHASES 2 AND 3

A review, consideration of alternatives, and recommendations for new or additional techniques shall be made regarding the existing sampling plan to be used by primary sampling units (PSU's) or teams of the National Accident Sampling System (NASS). Needlessly disruptive changes in the sampling plan, such as substantial changes in the definition of PSU's or elimination of the Current Population Survey selection scheme, are discouraged. The general requirements of this contract are as follows: improve the PSU sampling frame by modifying stratification, measure of size and controlled selection; determine appropriate methods of selecting accidents within the PSU's; develop the formulas for estimating statistics and their variances; determine rationale for special sampling frames, if necessary; determine how many teams there should be in NASS and how precisely NASS will estimate statistics; develop and document the PSU sampling frame for NASS Phases 2 and 3; and provide the appropriate materials for selection of the Phase 2 and 3 samples0pes

Westat, Inc., 11600 Nebel Street, Rockville, Maryland 20852
$189,047.00
To be completed twenty (20) months from date of contract award (30 Sep 77).

DOT-HS-7-01707

EVALUATION OF SAFETY BELT EDUCATION PROGRAM FOR EMPLOYEES

The National Highway Traffic Safety Administration's (NHTSA) safety belt educational program "package" designed to increase belt usage by employees shall be implemented and evaluated. Utilization of the educational materials (pamphlets, brochures, booklets, audio-visual presentations) developed for employees by a large number of governmental and industrial organizations has the potential for influencing a substantial segment of vehicle occupants to wear safety belts. This employee educational package has the advantage for study as compared to some of the other packages which have been developed (e.g., program designed for elementary school children) because of the relative ease of setting up evaluation procedures, i.e., high volume, valid observations of belt usage of vehicle occupants as they enter or leave controlled parking lots, etc.

Opinion Research Corporation, North Harrison Street, Princeton, Mercer County, New Jersey 08540
$56,335.00
To be completed fifteen (15) months from date of contract award (31 Aug 77).

DOT-HS-7-01708

SUPPORT FOR ANALYTICAL TOOLS FOR AUTOMOTIVE FUEL ECONOMY ACTIVITIES

Programming and analytical support and training in the use of analytical tools shall be provided to the National Highway Traffic Safety Administration (NHTSA) for its Automotive Fuel Economy Activities. In the determination of technological feasibility, economical practicability, the effects of motor

vehicle standards on fuel economy, and the nation's need to conserve energy, NHTSA has employed in its research and analysis analytical tools, accounting models, and data bases for assessment of automotive technology, automotive industry analysis, economic and marketing analysis and integrated analysis. It is the objective of this contract to train personnel of the Energy Research Division and the Office of Automotive Fuel Economy in the use of these assessment tools, to provide documentation and user manuals for their description and use as required, to provide capability for minor programming, to perform analysis and to utilize the assessment tools as required by the Office of Automotive Fuel Economy and Energy Research Division in support of Automotive Fuel Economy Activities.

"This contract is awarded by the Small Business Administration under the authority of Section 8(a) of the Small Business Act (USC 637a), and will be administered by the Department of Transportation, National Highway Traffic Safety Administration."
$48,097.00
To be completed twelve (12) months from date of contract award (7 Sep 77).

DOT-HS-7-01710

TIRE TREADWEAR TEST - MULTICYCLE

Tire treadwear multicycle testing shall be conducted to determine whether or not radial tires have constant wear rates except as influenced by environmental conditions or inherently show a decrease in rate with increased testing. Three convoys, each composed of four vehicles (a total of 12 (0 3 spare vehicles) identical vehicles) shall be provided and operated over a prescribed treadwear course.

Transportation Testing, Inc. of Texas, An Affiliate of Fabricated Machine Company, 1601 Old San Antonio Highway, Box 171, San Angelo, Texas 67903
$82,992.00
To be completed ten (10) weeks from date of contract award (2 Sep 77).

DOT-HS-7-01712

ROAD WORKER AND DISMOUNTED MOTORIST PEDESTRIAN SAFETY REGULATIONS

The enhancement of two model pedestrian safety regulations developed by the National Highway Traffic Safety Administration (NHTSA), the Model Road Work Site Law and the Model Freeway Stop Law, shall be accomplished in order that the regulations are advanced to the point of being available for full implementation if such is warranted. The contract shall consist of two phases. Phase 1 is a planning phase in which study sites are selected and all details regarding the experimental design are established; Phase 2 entails feasibility testing, the results of which address the issues of regulatory effectiveness, user compliance, and recommendations for the development of communication materials deemed necessary for implementing the regulations on a nationwide basis.

Dunlap and Associates, Inc., One Parkland Drive, Darien, Connecticut 06820
$118,325.00
To be completed twenty (20) months from date of contract award (26 Sep 77).

DOT-HS-7-01714

REPORTING POSSIBLE SAFETY DEFECT PROBLEMS AND CONDUCTINC SPECIAL SAFETY-RELATED SURVEYS

A diagnostic center information service regarding possible vehicle safety defects and safety defect investigations in progress shall be provided and safety defect-related surveys shall be conducted, upon request, for investigative purposes. The three categories of work to be performed under this contract are as follows: maintain listings of all probable defects discovered from collision and noncollision sources (a record of make, model, and model year together with a description of the defect); provide, upon request, the failure frequency of selected vehicle components by make, model and model year; and conduct, where deemed necessary, an investigation into a probable defect at an in-depth level.

Automobile Club of Southern California, P.O. Box 2890 Terminal Annex, Los Angeles, California 90051
Per Task Order
To be completed twelve (12) months from date of contract award (29 Sep 77).

DOT-HS-7-01715

IMPROVEMENT OF MATHEMATICAL MODELS FOR SIMULATION OF VEHICLE HANDLING

Improvement of mathematical models for simulation of vehicle handling shall be accomplished. Few general mathematical models and computer simulations have been in existence for the last few years. The Highway-Vehicle-Object Simulation Model and the Hybrid Computer Vehicle Handling Program are such simulations which have been successfully used for vehicle dynamic studies in the past. The HVHP/CARD Simulation uses a 17-degree-of-freedom model, but in spite of the many refinements which have been incorporated into this simulation, certain simplifying assumptions are made in the equations of motion. Specifically, terms involving products of angular velocities and their squares, as well as suspension deflections and their derivatives, have been neglected. Also, small angle approximations have been made in the equations of motion. A review of the available literature on the subject of simulation seems to indicate that no clear assessments have been made as to how these simplifications may affect certain vehicle handling maneuvers. Using the current HVHP/CARD model as a base, the objectives of this contract are as follows: develop a method(s) to formulate characteristics (mathematical expressions) that can be easily related to vehicle directional response (may be evolved completely analytically or on the basis of responses obtained from digital computer simulation under transient and steady-state conditions); using the methods developed above, establish a set of criteria to predict transient as well as steady-state vehicles behavior, for analytical models ranging from the most complete to the simplest representing varying degrees of sophistication in the HVHP/CARD model; predict trends and develop conclusions about driver/vehicle system limit handling capabilities on an analytical basis and examine performance transition gradients from linear to nonlinear range in each of the models under investigation; determine performance in the transition and nonlinear regime of parameters determined to be optimum from linear systems theory; compare existing vehicle full-scale test data for at least three classes of vehicles to the predicted results based on the established set of criteria as mentioned above; develop cost

and benefit relationship in vehicle modeling as related to control characteristics; and develop exclusive digital simulations and compare costs, relative accuracy, programming ease, etc. of the digital and hybrid simulations. 0 an

The Regents of the University of Michigan, The University of Michigan, 260 Research Administration Building, Ann Arbor, Michigan 48109
$135,900.00
To be completed thirteen (13) months from date of contract award (Sep 77).

DOT-HS-7-01716

AERODYNAMIC DISTURBANCE TEST PROCEDURE DEVELOPMENT

A research program shall be conducted to study the effects of aerodynamic disturbances on the safety-related response characteristics of motor vehicles. Vehicles shall be tested in a wind tunnel, by using wind machines and prototype test procedures developed for the National Highway Traffic Safety Administration (NHTSA), and by inputing the aerodynamic properties and the vehicle parametric properties of the test vehicles to a modified (for this research) NHTSA hybrid handling program at the Applied Physics Laboratory of the Johns Hopkins University (APL/JHU). The objectives of this contract are to evaluate the effects of aerodynamic disturbances on vehicle safety, to validate the NHTSA wind machine, and to produce aerodynamic test maneuvers and procedures suitable for future compliance testing.

Systems Technology, Inc., 13766 S. Hawthorne Blvd., Hawthorne, CA 90250
$201,014.00
To be completed eighteen (18) months from date of contract award (30 Sep 77).

DOT-HS-7-01719

ACCIDENT AVOIDANCE CAPABILITIES OF MOPEDS

An overall assessment of the accident avoidance capabilities of present production mopeds shall be made for the express purpose of predicting likely future safety problems to be brought on by the introduction of large numbers of mopeds into the U.S. transportation scheme. The accelerative, braking, handling and other vehicle-related performance characteristics of a representative sample of mopeds will be quantified by objective test methods previously developed for motorcycles. These performance data will then be used to hypothesize safety-related problems which are likely to arise. With this information the National Highway Traffic Safety Administration (NHTSA) can plan future research and rule-making requirements in a timely and efficient manner

Systems Technology, Inc., 13766 South Hawthorne Boulevard, Hawthorne, California 90250
$98,914.00
To be completed fourteen (14) months from date of contract award (9 Sep 77).

DOT-HS-7-01720

CAR-TRAILER HANDLING STANDARDS DEVELOPMENT

Handling and braking test procedures for passenger vehicles towing trailers developed under earlier contracts shall be refined, suitable safety requirement levels for use with these test procedures shall be identified or quantitative means to identify these levels shall be provided, and the braking and handling aspects of the test procedures and requirement levels shall be integrated. Specifically, the objectives of this contract are as follows: identify suitable braking performance requirement levels for combination vehicles (CV's) to be measured through the test procedures developed under Contract DOT-HS-802-101; refine the handling test procedures for trailers developed under Contract DOT-HS-801-935 and identify suitable handling requirement levels for CV's as well as for the trailer independent of the towing vehicle; and develop a set of integrated handling and braking requirements suitable for a Federal standard covering trailers (standard to be applicable to all trailers, regardless of the type of braking system used (e.g., electric or hydraulic)). 0ns

Systems Technology, Inc., 13766 S. Hawthorne Blvd., Hawthorne, California 90250
$196,000.00
To be completed fourteen (14) months from date of contract award (27 Sep 77).

DOT-HS-7-01721

OPTIMIZING AND EVALUATING REARVIEW MIRROR SYSTEMS FOR PASSENGER CARS, LIGHT TRUCKS AND MULTIPURPOSE PASSENGER VEHICLES

Optimization and evaluation of rearview mirror systems for passenger cars, light trucks and multipurpose passenger vehicles shall be accomplished. Experimental studies shall be conducted to achieve the following two major objectives: establish limits on acceptable radius of curvature for convex mirrors to be used within the context of specified rearview mirror systems; and evaluate the relative effectiveness of alternative designs for rearview mirror systems comparing effectiveness with current OEM (original equipment manufacturers) systems. During the course of this contract a total of 12 rearview mirror systems will be evaluated, three for passenger cars, four for pick-up trucks, and five for vans. In addition, six of the seven systems that employ inside mirrors will be tested with and without simulated passenger/cargo loading blocking the backlight. Thus, a total of 18 basic test conditions will be studied. 0s o

Vector Enterprises, Inc., 1550 17th Street, Santa Monica, California 90404
$177,667.00
To be completed eighteen (18) months from date of contract award (28 Sep 77).

DOT-HS-7-01722

ADVANCED MOTORCYCLE HANDLING AND DYNAMICS

Developmental work shall be conducted with regard to the National Highway Traffic Safety Administration's (NHTSA) in-house project titled the Advanced Concept Motorcycle (ACM). This project explored, with simulations and design layout, the conceptual feasibility of a motorcycle with an extremely low center of gravity, utilizing the rear wheel for steering. It is recognized that the ACM at the present time is not without problems. Without doubt, it will be longer, perhaps heavier, and have more complexity in some areas than conventional motorcycles. Questions concerning conspicuity may arise, although the design offers an opportunity to raise lighting systems above conventional heights. In total, the safety aspects of the ACM should be superior to conventional motorcycles since the concept offers solutions to the fundamental problems of conventional motorcycles. The objectives of this contract are as follows: verify through simulation the performance difference between the ACM and the conventional motorcycle, determine the applicability of conventional motorcycle technology to the ACM, produce conceptual design layouts for the ACM from which detail drawings may be made, and outline an ACM program which would culminate in the fabrication and testing of the ACM. 0s)

South Coast Technology, Inc., P.O. Box 3265, Santa Barbara, California 93105
$120,541.00
To be completed by 28 Sep 78.

DOT-HS-7-01723

VEHICLE ANTI-THEFT SECURITY SYSTEM DESIGN

Research shall be conducted concerning automobile theft and vehicle anti-theft security systems. Specifically, the objectives of this contract are to: identify, analyze, and recommend cost-beneficial anti-theft performance criteria which will reduce the high rate of vehicle theft; design, test, and validate an advanced anti-theft security system that will comply with the recommended anti-theft performance criteria; and develop and recommend required changes or additions to safety standard FMVSS No. 114, Theft Protection - Passenger Cars, that reflects the anti-theft performance criteria identified and recommended above.

Arthur D. Little, Inc., Acorn Park, Cambridge (Middlesex), Mass. 02140
$115,630.00
To be completed by 30 Sep 78.

DOT-HS-7-01724

LOW BEAM SHAPING FOR IMPROVED WIDE ANGLE ROADWAY ILLUMINATION

Research shall be conducted in an effort to provide the information required for developing an improved low headlight beam pattern which will result in increased angular dispersion of light for off-road visibility while maintaining effective illumination for seeing down the road. The recommended low beam pattern will be evaluated by comparison with existing headlighting systems. First, a field study shall be made to determine the amount of performance decrement attributable to specific and extreme degrees of visual field restrictions. Second, a field study shall be made to examine the driving performance at night related to angular dispersion of headlamp illumination. Finally, on the basis of the findings from the two previous tasks, isocandela curve specifications which best meet the requirements of an improved low beam headlamp pattern shall be developed and tested (field test to compare the recommended low beam pattern to the present standard American pattern and to the ECE (Economic Commission for Europe) pattern) and expert advice of the headlamp manufacturers and/or the appropriate SAE lighting committee shall be solicited to determine if the recommended isocandela curves can be manufactured for automotive headlighting application.

Human Factors Research, Inc., 6780 Cortona Drive, Goleta, California 93017
$79,240.00
To be completed fourteen (14) months from date of contract award (14 Sep 77).

DOT-HS-7-01725

TRUCK AND BUS SAFETY INSPECTION DEMONSTRATION PROJECT

The validity and effectiveness of the National Highway Traffic Safety Administration's (NHTSA) Vehicle In Use (VIU) Inspection Standard 570, Subpart B, in discovering safety-critical outages during periodic inspection of vehicles with GVWR of more than 10,000 pounds, shall be demonstrated. This contract is also intended to provide an opportunity for evaluating the commercially available heavy-duty inspection equipment presently available. The summary and analysis of this real-world inspection data will be convincing evidence of the practicality of the inspection equipment, procedures, and criteria (reject levels) employed. The NHTSA will initiate amendments to portions of the standard if the evidence supports a change.

District of Columbia, Department of Motor Vehicles, 301 C Street, N.W., Washington, D.C. 20590
$97,049.00
To be completed eight (8) months from date of contract award (27 Sep 77).

DOT-HS-7-01726

IDENTIFICATION AND DEVELOPMENT OF COUNTERMEASURES FOR BICYCLIST/MOTOR-VEHICLE PROBLEM TYPES

A study shall be conducted dealing with the identification and development of countermeasures for bicyclist/motor-vehicle problem types. The study shall consist of three phases. Phase 1 is concerned with the development of recommended countermeasure approaches based upon a review/analysis of National Highway Traffic Safety Administration (NHTSA) data, relevant literature, and existing countermeasures. In Phase 2, selected recommended countermeasures shall be developed into outline form for further consideration by NHTSA. Phase 3 shall develop selected countermeasure outlines into prototype countermeasures in the areas of training courses, safety

messages, and bicyclist safety regulations; test plans for each developed countermeasure shall also be developed. 0s o

Dunlap and Associates, Inc., One Parkland Drive, Darien, Connecticut 06820
$322,884.00
To be completed twenty-four (24) months from date of contract award (28 Sep 77).

DOT-HS-7-01728

FUEL LEAKAGE METHODOLOGY

A workable methodology for the detection and measurement of fuel spillage in motor vehicle collisions shall be developed. The emphasis on this contract shall address the data collection procedure for an evaluation of FMVSS No. 301-75. The following tasks shall be performed: a comprehensive survey and literature review of crash-involved, vehicle-related spillage/leakage/fire; development of a methodology for identifying the presence of fuel leakage or spillage; development of a method of documenting the fuel leakage source; a comprehensive survey of existing equipment to aid in fuel leakage detection; and incorporation of a means of assessing the volume of fuel spillage and rate of spillage into the fuel leakage methodology.

The Regents of the University of Michigan, 260 Research Administration Building, Ann Arbor, Mich. 48105
$52,010.00
To be completed three (3) months from date of contract award (23 Sep 77).

DOT-HS-7-01731

DEVELOP NEW CURRICULUM AND REVISE EXISTING CURRICULUMS

Training curriculum materials shall be developed or revised in four traffic safety areas for the National Highway Traffic Safety Administration (NHTSA). The four areas for materials development are: Financial Management of State Highway Safety Programs (new curriculum); Prearrest Screening - Alcohol and Highway Safety (new curriculum); First Responders: Emergency Medical Care Training - CIM (Crash Injury Management) Course Revision; and Revision of Curriculum: Evaluation of Highway Traffic Safety Programs.

Dunlap and Associates, Inc., One Parkland Drive, Darien, Connecticut 06820
$158,973.00
To be completed fourteen (14) months from date of contract award (Sep 77).

DOT-HS-7-01733

TIME AND MATERIALS TYPE WITH TASK ORDERS FOR CONTACTS WITH MOTOR VEHICLE OWNERS OBTAINING PHOTOGRAPHS AND ACCIDENT REPORTS RELATED TO SAFETY DEFECTS INVESTIGATIONS

Materials shall be collected and motor vehicle owners shall be interviewed in conducting Safety Defects Investigations for the National Highway Traffic Safety Administration (NHTSA). The objectives of this contract are as follows: determine facts which pertain to the allegations of safety-related defects reported by vehicle owners; interview individuals designated by NHTSA as necessary concerning details of possible safety-related defects; and examine, in every possible case, the failed component of the motor vehicle; and prepare reports for submission to NHTSA's Office of Defects Investigation.

Kappa Systems, Inc., 1501 Wilson Boulevard, Arlington, Virginia 22209
$25,000.00
To be completed one (1) year from date of contract award (26 Sep 77).

DOT-HS-7-01734

TIME AND MATERIALS TYPE WITH TASK ORDERS FOR CONTACTS WITH MOTOR VEHICLE OWNERS OBTAINING PHOTOGRAPHS AND ACCIDENT REPORTS RELATED TO SAFETY DEFECTS INVESTIGATIONS

Materials shall be collected and motor vehicle owners shall be interviewed in conducting Safety Defects Investigations for the National Highway Traffic Safety Administration (NHTSA). The objectives of this contract are as follows: determine facts which pertain to the allegations of safety-related defects reported by vehicle owners; interview individuals designated by NHTSA as necessary concerning details of possible safety-related defects; examine, in every possible case, the failed component of the motor vehicle; and prepare reports for submission to NHTSA's Office of Defects Investigation. met

General Adjustment Bureau, 4201 Connecticut Avenue, N.W., Suite 300, Washington, D.C. 20008
$25,000.00
To be completed one (1) year from date of contract award (26 Sep 77).

DOT-HS-7-01735

ADVANCED MOTORCYCLE RIDER COURSE DEVELOPMENT PLAN

A development plan for an advanced motorcycle rider course shall be formulated. The course shall be based upon an accurate assessment of rider needs for advanced instruction, and educational system alternatives for providing instruction. The Advanced Rider Course would appear to have potential value in fostering motorcycle safety by providing instruction relative to skills and knowledges that are too difficult and/or require more time to acquire than can be provided in a beginning course, e.g. National Highway Traffic Safety Administration (NHTSA) Motorcycle Rider Course. The Advanced Rider Course would be attended by the following groups: graduates of the Motorcycle Rider Course who want more advanced instruction, experienced riders who never had formal instruction, former riders who need refresher training but who would not be willing to attend a novice course, and problem motorcycle operators selected as part of a state's driver licensing agency driver improvement program. Curriculum specifications for

advanced instruction are included in the Motorcycle Curriculum Specifications recently completed for NHTSA.

National Public Services Research Inst., 421 King Street, Alexandria, Virginia 22314
$89,960.00
To be completed by 27 Sep 78.

DOT-HS-7-01737

ANALYSIS FOR DRUGS IN SALIVA AND BREATH

Methods shall be developed for using breath and saliva as biological samples to detect and quantify drug concentrations in drivers, and to be able, if possible, to infer previous levels of drug concentration. For purposes of this contract, these methods need not be developed for roadside application. The product of this contract will be drug detection methods that are ready for operational use in future drug incidence research studies. It is the purpose of this effort to use samples of breath and/or saliva, and to develop practical operational methods, procedures, and equipment for the collection, extraction, identification, and quantification of selected drugs which are considered possible highway safety hazards, and to assess the feasibility of estimating the drug concentration at the time of the accident based on samples collected some time later.

Research Triangle Institute, P.O. Box 12194, Durham County, Research Triangle Park, N.C. 27709
$201,142.00
To be completed twenty-four (24) months from date of contract award (28 Sep 77).

DOT-HS-7-01738

ESTABLISHMENT OF NASS TEAMS

Three persons interested in and capable of professional motor vehicle accident investigation full-time for a 36-month period shall be provided. The three individuals will take part in a pilot study of the National Accident Sampling System (NASS) which will eventually consist of 30-60 small teams of accident investigators situated throughout the 48 contiguous states. For purposes of this contract, the most important part will be a controlled experiment to compare the quantity and quality of data collected by three- and five-person teams. The project will consist of the following five phases: training and establishing an operating team (4 months), continuous data collection by a 3- (5) person team (4 months), continuous data collection by a 5- (3) person team (4 months), additional data collection in the form of a special study by the 3-person team (3 months), and continuous data collection of a nature similar to the previous three phases (21 months). The two additional personnel participating in the second and third pnases will be employees of a Zone Center contractor assigned to the team and subject to supervision by the team.

IIT Research Institute, 10 West 35th Street, Chicago, Illinois 60616
$278,858.00
To be completed thirty-six (36) months from date of contract award (30 Sep 77).

DOT-HS-7-01739

ESTABLISHMENT OF NASS TEAMS

Three persons interested in and capable of professional motor vehicle accident investigation full-time for a 36-month period shall be provided. The three individuals will take part in a pilot study of the National Accident Sampling System (NASS) which will eventually consist of 30-60 small teams of accident investigators situated throughout the 48 contiguous states. For purposes of this contract, the most important part will be a controlled experiment to compare the quantity and quality of data collected by three- and five-person teams. The project will consist of the following five phases: training and establishing an operating team (4 months), continuous data collection by a 3- (5) person team (4 months), continuous data collection by a 5- (3) person team (4 months), additional data collection in the form of a special study by the 3-person team (3 months), and continuous data collection of a nature similar to the previous three phases (21 months). The two additional personnel participating in the second and third phases will be employees of a Zone Center contractor assigned to the team and subject to supervision by the team

Kappa Systems, Inc., 1501 Wilson Boulevard, Arlington, Virginia 22209
$329,453.00
To be completed thirty-six (36) months from date of contract award (30 Sep 77).

DOT-HS-7-01740

ESTABLISHMENT OF NASS TEAMS

Three persons interested in and capable of professional motor vehicle accident investigation full-time for a 36-month period shall be provided. The three individuals will take part in a pilot study of the National Accident Sampling System (NASS) which will eventually consist of 30-60 small teams of accident investigators situated throughout the 48 contiguous states. For purposes of this contract, the most important part will be a controlled experiment to compare the quantity and quality of data collected by three- and five-person teams. The project will consist of the following five phases: training and establishing an operating team (4 months), continuous data collection by a 3- (5) person team (4 months), continuous data collection by a 5- (3) person team (4 months), additional data collection in the form of a special study by the 3-person team (3 months), and continuous data collection of a nature similar to the previous three phases (21 months). The two additional personnel participating in the second and third phases will be employees of a Zone Center contractor assigned to the team and subject to supervision by the team. 0itt

The Franklin Institute, 20th and The Parkway, Philadelphia, Pennsylvania 19103
$372,941.00
To be completed thirty-six (36) months from date of contract award (30 Sep 77).

DOT-HS-7-01741

ESTABLISHMENT OF NASS TEAMS

Three persons interested in and capable of professional motor vehicle accident investigation full-time for a 36-month period

shall be provided. The three individuals will take part in a pilot study of the National Accident Sampling System (NASS) which will eventually consist of 30-60 small teams of accident investigators situated throughout the 48 contiguous states. For purposes of this contract, the most important part will be a controlled experiment to compare the quantity and quality of data collected by three- and five-person teams. The project will consist of the following five phases: training and establishing an operating team (4 months), continuous data collection by a 3- (5) person team (4 months), continuous data collection by a 5- (3) person team (4 months), additional data collection in the form of a special study by the 3-person team (3 months), and continuous data collection of a nature similar to the previous three phases (21 months). The two additional personnel participating in the second and third phases will be employees of a Zone Center contractor assigned to the team and subject to supervision by the Team.0eam

Southwest Research Institute, 8500 Culebra Road, San Antonio, Texas 78284
$334,487.00
To be completed thirty-six (36) months from date of contract award (30 Sep 77).

DOT-HS-7-01742

ESTABLISHMENT OF NASS TEAMS

Three persons interested in and capable of professional motor vehicle accident investigation full-time for a 36-month period shall be provided. The three individuals will take part in a pilot study of the National Accident Sampling System (NASS) which will eventually consist of 30-60 small teams of accident investigators situated throughout the 48 contiguous states. For purposes of this contract, the most important part will be a controlled experiment to compare the quantity and quality of data collected by three- and five-person teams. The project will consist of the following five phases: training and establishing an operating team (4 months), continuous data collection by a 3- (5) person team (4 months), continuous data collection by a 5- (3) person team (4 months), additional data collection in the form of a special study by the 3-person team (3 months), and continuous data collection of a nature similar to the previous three phases (21 months). The two additional personnel participating in the second and third phases will be employees of a Zone Center contractor assigned to the team and subject to supervision by the team.

Alabama Traffic Safety Center, University of Montevallo, Montevallo, Alabama 35115
$418,115.00
To be completed thirty-six (36) months from date of contract award (30 Sep 77).

DOT-HS-7-01743

ESTABLISHMENT OF NASS TEAMS

Three persons interested in and capable of professional motor vehicle accident investigation full-time for a 36-month period shall be provided. The three individuals will take part in a pilot study of the National Accident Sampling System (NASS) which will eventually consist of 30-60 small teams of accident investigators situated throughout the 48 contiguous states. For purposes of this contract, the most important part will be a

data collected by three- and five-person teams. The project will consist of the following five phases: training and establishing an operating team (4 months), continuous data collection by a 3- (5) person team (4 months), continuous data collection by a 5- (3) person team (4 months), additional data collection in the form of a special study by the 3-person team (3 months), and continuous data collection of a nature similar to the previous three phases (21 months). The two additional personnel participating in the second and third phases will be employees of a Zone center contractor assigned to the team and subject to supervision by the team.

Management Engineers, Inc., Suite 320, 11800 Sunrise Valley Drive, Reston, Virginia 22091
$330,007.00
To be completed thirty-six (36) months from date of contract award (30 Sep 77).

DOT-HS-7-01744

ESTABLISHMENT OF NASS TEAMS

Three persons interested in and capable of professional motor vehicle accident investigation full-time for a 36-month period shall be provided. The three individuals will take part in a pilot study of the National Accident Sampling System (NASS) which will eventually consist of 30-60 small teams of accident investigators situated throughout the 48 contiguous states. For purposes of this contract, the most important part will be a controlled experiment to compare the quantity and quality of data collected by three- and five-person teams. The project will consist of the following five phases: training and establishing an operating team (4 months), continuous data collection by a 3- (5) person team (4 months), continuous data collection by a 5- (3) person team (4 months), additional data collection in the form of a special study by the 3-person team (3 months), and continuous data collection of a nature similar to the previous three phases (21 months). The two additional personnel participating in the second and third phases will be employees of a Zone Center contractor assigned to the team and subject to supervision by the team. 0ed

Highway Safety Planning Division, Department of State Police, 7150 Harris Drive, General Office Building, Lansing, Michigan 48910
$361,185.00
To be completed thirty-six (36) months from date of contract award (30 Sep 77).

DOT-HS-7-01745

ESTABLISHMENT OF NASS TEAMS

Three persons interested in and capable of professional motor vehicle accident investigation full-time for a 36-month period shall be provided. The three individuals will take part in a pilot study of the National Accident Sampling System (NASS) which will eventually consist of 30-60 small teams of accident investigators situated throughout the 48 contiguous states. For purposes of this contract, the most important part will be a controlled experiment to compare the quantity and quality of data collected by three- and five-person teams. The project will consist of the following five phases: training and establishing an operating team (4 months), continuous data collection by a 3- (5) person team (4 months), continuous data collection

n the form of a special study by the 3-person team (3 months), and continuous data collection of a nature similar to the previous three phases (21 months). The two additional personnel participating in the second and third phases will be employees of a Zone Center contractor assigned to the team and subject to supervision by the Team. gne

KLD Associates, Inc., 300 Broadway, Huntington Station, New York 11746
$337,129.00
To be completed thirty-six (36) months from date of contract award (30 Sep 77).

DOT-HS-7-01746

ESTABLISHMENT OF NASS TEAMS

Three persons interested in and capable of professional motor vehicle accident investigation full-time for a 36-month period shall be provided. The three individuals will take part in a pilot study of the National Accident Sampling System (NASS) which will eventually consist of 30-60 small teams of accident investigators situated throughout the 48 contiguous states. For purposes of this contract, the most important part will be a controlled experiment to compare the quantity and quality of data collected by three- and five-person teams. The project will consist of the following five phases: training and establishing an operating team (4 months), continuous data collection by a 3- (5) person team (4 months), continuous data collection by a 5- (3) person team (4 months), additional data collection in the form of a special study by the 3-person team (3 months), and continuous data collection of a nature similar to the previous three phases (21 months). The two additional personnel participating in the second and third phases will be employees of a Zone Center contractor assigned to the team and subject to supervision by the Team.

Texas A and M Research Foundation, F E Box H, College Station, Texas 77843
$314,354.00
To be completed thirty-six (36) months from date of contract award (30 Sep 77).

DOT-HS-7-01747

ESTABLISHMENT OF NASS TEAMS

Three persons interested in and capable of professional motor vehicle accident investigation full-time for a 36-month period shall be provided. The three individuals will take part in a pilot study of the National Accident Sampling System (NASS) which will eventually consist of 30-60 small teams of accident investigators situated throughout the 48 contiguous states. For purposes of this contract, the most important part will be a controlled experiment to compare the quantity and quality of data collected by three- and five-person teams. The project will consist of the following five phases: training and establishing an operating team (4 months), continuous data collection by a 3- (5) person team (4 months), continuous data collection by a 5- (3) person team (4 months), additional data collection in the form of a special study by the 3-person team (3 months), and continuous data collection of a nature similar to the previous three phases (21 months). The two additional personnel participating in the second and third phases will be employees of a Zone Center contractor assigned to the team and subject to supervision by the Team.0he

University of Southern California, University Park, Los Angeles, California 90007
$378,983.00
To be completed thirty-six (36) months from date of contract award (30 Sep 77).

DOT-HS-7-01749

IDENTIFICATION AND FEASIBILITY TEST OF SPECIALIZED RURAL PEDESTRIAN SAFETY TRAINING

Feasible training countermeasures that show promise for reducing specific types of rural pedestrian accidents shall be identified. This is to be accomplished by a research study to identify specialized training programs which potentially impact upon the behaviors associated with rural accident types, and to develop and assess selected programs for modifying the specific erroneous behaviors. This contract shall be conducted in three phases. Phase 1 is an analytical phase in which an analysis of existing rural pedestrian accident data will be made to identify rural pedestrian accident types for which specific training countermeasures are potentially applicable. The training program(s) most appropriate for each of the identified types will be identified and specified in outline form. The end result of this phase will be the selection of a subset of training-program outlines deemed most suitable for development. Phase 2 will be concerned with the development of the selected training programs in preparation for feasibility testing. Phase 3 will involve an assessment of each training program's effectiveness in modifying specific accident-related behaviors, and the development of training manual(s) for effective programs.

Applied Science Associates, Inc., Box 158, Valencia, Butler County, PA 16059
$174,658.00
To be completed twenty (20) months from date of contract award (30 Sep 77).

DOT-HS-7-01751

ACCELERATOR CONTROL SYSTEMS

Motor vehicle accelerator control systems shall be tested in accordance with FMVSS No. 124 (National Highway Traffic Safety Administration's (NHTSA) Office of Standards Enforcement (OSE) Laboratory Test Procedure TP-124-02 dated April 7, 1976).

Dynamic Science, Inc., 1850 West Pinnacle Peak Road, Phoenix, Arizona 85047
Per Delivery Order
To be completed one (1) year from date of contract award (30 Sep 77).

DOT-HS-7-01752

ACCELERATOR CONTROL SYSTEMS

Motor vehicle accelerator control systems shall be tested in

Safety Administration's (NHTSA) Office of Standards Enforcement (OSE) Laboratory Test Procedure TP-124-02 dated April 7, 1976).

Ball Brothers Research Corp., Post Office Box 1062, Boulder, Boulder County, Colorado 80306
Per Delivery Order
To be completed one (1) year from date of contract award (30 Sep 77).

DOT-HS-7-01753

DEVELOPMENT OF MODEL REGULATIONS FOR RURAL PEDESTRIAN SAFETY

A study shall be conducted dealing with the development of model pedestrian safety regulations for the rural/suburban/freeway areas. In an earlier study, the National Highway Traffic Safety Administration (NHTSA) sponsored the development of a set of model pedestrian safety regulations designed to reduce specific types of urban pedestrian accidents. It is the intent of this contract to repeat this developmental process for the rural/suburban/freeway areas.

Dunlap and Associates, Inc., One Parkland Drive, Darien, Fairfield, Connecticut 06820
$107,700.00
To be completed fifteen (15) months from date of contract award (28 Sep 77).

DOT-HS-7-01754

SYSTEMS OPTIMIZATION OF STATE ACCIDENT DATA BASES

This contract calls for the contractor to visit twenty (20) states and to offer, and install where the offer is accepted, the DART (Data' Analysis and Reporting Techniques) software recently developed by the National Highway Traffic Safety Administration (NHTSA). This computerized statistical analysis package was designed to operate on state accident data and responds to the general need for a capability to provide data and analyses from state accident data systems that will enable them to establish programs based on quantifiably expressed problems. The states that have been tentatively selected as candidates for this assistance are the following: Alabama, California, Kansas, Louisiana, Maryland, Minnesota, Missouri, Nevada, New Hampshire, New Mexico, New York, Ohio, Oregon, Pennsylvania, Puerto Rico, Tennessee, Utah, Vermont, Washington and Wyoming. The specific objectives of this contract are as follows: to upgrade the states' capability to analyze accident data and to produce the type of statistical reports required by safety program managers for problem identification, program management and program evaluation; and to determine whether appropriate data elements are available in each state for analysis by the DART package and, where deficient, to make recommendations to the state for incorporating these data into its system (data elements relating to problem identification and program evaluation such as alcohol involvement, accident location, safety equipment usage, etc.). 0ady

GENASYS Corporation, 11300 Rockville Pike, Rockville, Maryland 20852
$286,444.00
To be completed one (1) year from date of contract award (Sep 77).

DOT-HS-7-01755

EVALUATION OF THE EFFECTIVENESS OF FEDERAL MOTOR VEHICLE SAFETY STANDARD 301 - FUEL SYSTEM INTEGRITY, PASSENGER CARS

An evaluation shall be made of the effectiveness of FMVSS No. 301, Fuel System Integrity--Passenger Cars, by collecting and analyzing data from selected state and/or local fire and police department records on fuel spillage and fuel-fed fires in passenger car accidents.de

The Regents of the University of Michigan, 260 Research Administration Building, The University of Michigan, Ann Arbor, Michigan 48105
$114,450.00
To be completed twelve (12) months from date of contract award (30 Sep 77).

DOT-HS-7-01756

VALIDATION OF THE REAR LIGHTING AND SIGNALLING SYSTEM FIELD TEST

A validation shall be made of the data obtained in the National Highway Traffic Safety Administration's (NHTSA) ongoing rear lighting and signalling system field research by replicating the experiment using a different type of vehicle fleet and a different driving environment as well as a different contractor. Because of the importance of these rear lighting and signalling systems as potential countermeasures to be used for rear-end accident reduction, it is necessary to validate the present findings. The following rear lighting concepts are being studied: a single center high-mounted stop signal lamp, dual high-mounted stop and turn signal lamps, and separated stop and presence lamps in their conventional locations at the rear of the vehicle. On the basis of the results from the ongoing study, consideration will be given to eliminating the less promising system(s) so that other relevant high-mounted rear lighting systems can be tested.

Allen Corporation of America, 517 South Washington Street, Alexandria, Virginia 22314
$99,937.00
To be completed twenty (20) months from date of contract award (30 Sep 77).

DOT-HS-7-01757

EXPLORATORY ANALYSIS (HSRC ACCIDENT DATA FILES)

The Highway Safety Research Center (HSRC) of the University of North Carolina shall permit the National Highway Traf-

fic Safety Administration (NHTSA) to retrieve and analyze data from its computerized vehicle-driver-accident files. Access will be established in the following two ways: direct interrogation by NHTSA personnel of files available through the RAPID (Rapid Access Program for Information and Decision) system, and interrogation by HSRC personnel of other available North Carolina files in consultation with NHTSA personnel. Computer services will be provided through the IBM 360/75 at the University of North Carolina Computation Center and/or the IBM 370/175 at the Triangle Universities Computation Center. The latter is an installation shared by Duke University, North Carolina State University and the University of North Carolina at Chapel Hill.

The University of North Carolina, Highway Safety Research Center, Chapel Hill, North Carolina 27514
$10,000.00
To be completed ten (10) months from date of contract award (19 Sep 77).

DOT-HS-7-01758

DEVELOP TEST METHODOLOGY FOR EVALUATING CRASH COMPARABILITIES AND AGGRESSIVENESS

A test methodology for evaluating crash compatibilities and vehicle aggressiveness shall be developed. A second generation segmented-load cell barrier test device shall be developed. This improved design shall have all capabilities of the first generation (Fiat) test tool plus greater capacity load cells, increased width to provide ability for testing all passenger vehicles in the domestic traffic mix, ability for higher speed impacts, and flexibility in removing moving barrier face/load cell configuration and attaching to fixed barrier. After approval of the design, the improved test tool shall be fabricated, tested, and evaluated. The objectives of this contract are as follows: to provide data for establishing appropriate criteria for evaluating vehicle aggressiveness, and to investigate the Fiat/Dynamic Science load cell barrier test methodology for sensitivity to measure the basic types of aggressiveness.

Dynamic Science, Inc., 1850 West Pinnacle Peak Road, Phoenix, Arizona 85027
$247,013.00
To be completed twelve (12) months from date of contract award (30 Sep 77).

DOT-HS-7-01759

EFFECTS OF RECENT VEHICLE DESIGN CHANGE ON SAFETY PERFORMANCE

The effects of recent vehicle design change on safety performance shall be investigated.

Kinetic Research, Inc., 4513 Vernon Boulevard, Madison, Wisconsin 53705
$97,851.00
To be completed by 30 Mar 79.

DOT-HS-7-01762

FEASIBILITY OF DESIGNATING MEDICAL EXAMINERS FOR INTERSTATE COMMERCIAL VEHICLE DRIVERS

The feasibility of designating medical examiners for interstate commercial vehicle drivers shall be studied. General requirements of a system designed to designate medical examiners shall be identified, the acceptability of the general concept(s) shall be established, and if the concept is acceptable, detailed requirements for the system shall be developed to include those of administration and cost0x,

Health and Safety Associates, Inc., P.O. Box 222, Morton Grove, Illinois 60053
$52,060.00
To be completed six (6) months from date of contract award (Sep 77).

DOT-HS-7-01763

EVALUATION/ASSESSMENT SYSTEM DEVELOPMENT AND DEMONSTRATION

A system shall be developed for evaluating, assessing, and reporting the relationship of a state's 402 program activities to the overall trends and results of the state highway safety effort to show the relationship and link to the total management cycle, and this system shall be demonstrated in a state over a full management cycle. The products of this effort will consist of a handbook for evaluating, assessing and reporting on a state's total highway safety activities and an Annual Report for the state at the conclusion of the demonstration effort. Development of this system must include provisions for measuring programs in terms of expenditures, purchases, performance (success or failure of programs to meet objectives), related to achievement of established goals and objectives.

National Public Services Research Institute, 421 King Street, Alexandria, Virginia 22314
$224,209.00
To be completed thirty-five (35) months from date of contract award (30 Sep 77).

DOT-HS-7-01764

QUANTIFICATION OF OCCUPANT RESPONSE AND INJURY FROM IMPACT

Forty-five (45) cadaveric impact tests shall be conducted with the following general conditions: all tests to utilize the NHTSA (National Highway Traffic Safety Administration) standardized instrumentation array specified in the Instrumentation Requirements Section; age of the majority of the specimens to be less than 45 years of age; tests to be conducted utilizing a variety of impact conditions and intensities which have been arrived at in consultation with NHTSA; detailed pathological examinations to be conducted of each test specimen to document each and all trauma produced as a result of the test; and on a periodic basis, a summary report to be provided to NHTSA documenting the test conditions, mea-

sured responses, and pathological findings of tests performed during the time period. 0 an

Institut fur Rechtsmedizin, Vosstrasse 2, 6900 Heidelberg, West Germany
$151,403.00
To be completed thirty (30) months from date of contract award (30 Sep 77).

DOT-HS-7-01765

YOUTH LICENSE CONTROL DEMONSTRATION PROJECT

The concept of a provisional (graduated) licensing system for young novice drivers shall be tested. The overall goal of this demonstration project is to determine whether a comprehensive countermeasure program incorporating existing driver regulation procedures and certain new innovative techniques in a provisional licensing system can reduce the incidence of automobile accidents and traffic violations among youthful novice drivers. The following key countermeasure objectives are necessary to accomplish this goal: to increase the amount of supervised driving practice received by young drivers, to implement more demanding testing and licensing procedures for young novice drivers, to restrict novice driving exposure during high-risk nighttime hours for either all drivers or problem novice drivers, and to provide for increased monitoring of novice driving records and speedy, effective driver improvement actions for problem novice drivers. 0d.

Motor Vehicle Administration, State of Maryland, 6601 Ritchie Highway, N.E., Glen Burnie, Maryland 21062
$749,971.00
To be completed five (5) years from date of contract award (30 Sep 77).

DOT-HS-7-01766

DEVELOPMENT OF DRIVER IMPROVEMENT SYSTEM FOR TRAFFIC VIOLATORS AND ACCIDENT REPEATERS

A driver improvement system designed to systematically increase safety knowledge levels and meet attitudinal needs of convicted traffic violators and accident repeaters which will lead to their improved road performance, shall be developed and field tested. The general requirements of this contract are as follows: review point systems and other state mechanisms that identify the accident repeater and traffic violator and design a system that will select drivers who require improvement in these areas, design and/or select the informational components needed at each stage of the driver improvement system, identify basic qualifications of instructors of driver improvement programs that are designed for traffic violators and accident repeaters, develop a model driver improvement system, field test the driver improvement system utilizing representative instructors within one of the cooperative states, modify instructional programs as required based on results of field implementation, and establish requirements for a demonstration program designed to evaluate the accident reduction effectiveness of the proposed driver improvement system. 0r a

National Public Services Research Institute, 421 King Street, Alexandria, Virginia 22314
$164,971.00
To be completed twenty (20) months from date of contract award (Sep 77).

DOT-HS-7-01767

COST EVALUATION FOR FOUR FEDERAL MOTOR VEHICLE SAFETY STANDARDS

Cost evaluation shall be made of four Federal Motor Vehicle Safety Standards, FMVSS No. 214 (Side Door Strength), FMVSS No. 215 (Exterior Protection), FMVSS No. 301 (Fuel System Integrity), and FMVSS No. 208 (Occupant Crash Protection). The general requirement of this study is to determine the out-of-pocket costs to the consumer resulting from manufacturing changes to motor vehicles in order that they comply with each of the four FMVSS under consideration. Each standard is to be considered separately, that is the costs ascribed to each of the standards is estimated independent of the other three, however, the overall data gathering or acquisition should be combined or integrated into one. This consumer cost estimate is one of the factors to be considered in NHTSA's (National Highway Traffic Safety Administration) overall evaluation of the effectiveness of each of the standards (the other factor, not to be considered in this study, is consumer benefits).

The John Z. De Lorean Corporation, Post Office Box 427, Bloomfield Hills, Michigan 48013
$129,816.00
To be completed nine (9) months from date of contract award (30 Sep 77).

DOT-HS-7-01769

DEVELOP MOTOR VEHICLES MATERIALS HIGH VOLUME INDUSTRIAL PROCESSING RATES COST DATA BANK 3500-4000 LB. FULL SIZE CAR

Vehicle subassemblies and subassembly components by weight, material types, processing methods, high-volume industrial fixed and variable cost-per-pound and/or other industry practice measurement shall be identified for the new, weight-conscious 1977 full-size passenger vehicle. The vehicle engines and drive trains will be included in this study. The fixed cost portion will be identified separately indicating the amortization cycle years. These data should be in the manual chart form, yet applicable for subsequent mechanical storage consideration. These data are needed toward identification and establishment of a weight-conscious motor vehicles materials high-volume industrial processing cost passenger car data bank. These data are needed to establish the reference base data bank for ongoing use in simplified building-block estimating system that will facilitate the estimating task, maintaining standardized across-the-board estimating procedures and for

generating consumer cost estimates for proposed rule-making actions.

Pioneer Engineering and Manufacturing Company, 2500 E. Nine Mile Road, Warren, Michigan 48091
$87,758.00
To be completed nine (9) months from date of contract award (26 Sep 77).

DOT-HS-7-01771

REVIEW OF THE PROCEDURE FOR DETERMINING AVERAGE FUEL ECONOMY

A review shall be made of the Environmental Protection Agency's (EPA) procedure for determining average fuel economy of automobiles. The current EPA procedure for determining the average fuel economy is based on a representative approach rather than on a statistical sampling approach. It appears that the procedure will be accepted, at least, for the short-term needs. In the longer term, however, as the fuel economy standards become more stringent, difficulties due to the uncertainties of the current EPA procedure could arise. Therefore, the possibility of improving the accuracy of the fuel economy estimates is to be investigated on a cost-effectiveness basis. Results of this study must be usable as direct inputs to policy decisions, and as such must be easily communicable to laymen as well as users of various forecasting models.

EIC Corporation, 55 Chapel Street, Newton, Massachusetts 02158
$126,344.00
To be completed eighteen (18) months from date of contract award (30 Sep 77).

DOT-HS-7-01772

REAR IMPACT PROTECTION STUDIES

Tests shall be conducted with human surrogates to study and evaluate methods to protect front seat passengers from injury in rear impact collisions. Protective methods studied will include bench seats with standard head rests raised to various heights relative to the test subject, and high back bucket seats. An impact sled will be used to simulate the crash kinematics of a vehicle impacted from the rear by a vehicle of approximately equal weight at impact velocities between 25 and 40 mph. Injuries will be correlated with the test subject's crash kinematics, especially that of the head-neck complex.

Regents of New Mexico State University, Physical Science Laboratory, P.O. Box 3548, Las Cruces, Dona Ana, New Mexico 88003
$101,900.00
To be completed twelve (12) months from date of contract award (30 Sep 77).

DOT-HS-7-01773

RESPONSE OF HUMAN SURROGATES IN SIDE IMPACT

The response to side impact using human surrogates as test subjects shall be studied. The subjects shall be in a normal seated position on a hard bench seat and shall be restrained during impact by two independent, plane, rigid surfaces, one at the thigh and the other at the shoulder. Before and during the initiation of impact, the subjects shall be in contact with the rigid surfaces. By their being rigid, the surfaces permit the measurement of external forces, that is, the forces of the lateral impact environment acting directly on the subjects. The subject's response to lateral forces shall be measured and compared. (The crash severity of the sled shall range from 6G, 14 ft/sec to 30G, 21 ft/sec.) as

Regents of New Mexico State University, Physical Science Laboratory, P.O. Box 3548, Las Cruces, Dona Ana, NM 88003
$149,150.00
To be completed twelve (12) months from date of contract award (30 Sep 77).

DOT-HS-7-01774

CRASH PROTECTION SYSTEMS FOR HANDICAPPED SCHOOL BUS OCCUPANTS

Crash protection systems for handicapped school bus occupants shall be studied. The objectives of this contract are as follows: compile, from existing data files, and analyze the injury and fatality data covering handicapped occupants involved in crashes in conventional school buses, transit buses, and van-type school buses. Where possible the analysis should consider the quantity of injuries and fatalities, the seriousness of the injuries, and specific causes(s) of injuries and deaths; design (or identify), develop, test, demonstrate, and document an optimum crash protection system(s) to protect both side-facing and rear-facing and wheelchair-seated handicapped occupants in school buses and transit buses; identify, and document an optimum lift(s), ramp(s), tie down(s) or securement device(s) and other ingress and egress hardware that enhance the safety of the handicapped occupant during operational and crash situations; and fabricate a full-scale engineering mock-up of that portion of a bus necessary to incorporate a crash protection system for both side- and/or rear-facing handicapped occupants and wheelchair-seated passengers.

Minicars, Inc., 35 La Patera Lane, Goleta, California 93017
$334,176.00
To be completed eighteen (18) months from date of contract award (30 Sep 77).

DOT-HS-4-00897 Mod. 3

IMPACT OF RECENT CHANGE IN HIGHWAY SAFETY ENVIRONMENT

Tabulations shall be produced of North Carolina traffic accidents using the Highway Safety Research Center's (HSRC) 1973-1975 accident tapes. The classification of injuries by weights of involved vehicles will be carried out at least in the following subsets of data: all accidents, all single-vehicle nonpedestrian accidents, all pedestrian accidents, all 2-motor-vehicle accidents, urban accidents, urban 2-car accidents, urban single-vehicle accidents, urban pedestrian accidents, rural accidents, rural 2-car accidents, rural single-vehicle accidents, rural pedestrian accidents, high-speed accidents, and low-speed accidents. The effects of belt use or nonuse and impact area (front, side, rear) will be determined in each case and the data will be aggregated where possible, otherwise analyzed in

detail. Also, the effects of vehicle weight upon the risk of fatal injury and risk of at least severe injury shall be estimated in each of the cases listed by a statistical smoothing or fitting process to be determined by the contractor.

The University of North Carolina, Highway Safety Research Center, Chapel Hill, North Carolina 27514
Increased $9,996.00
Extended through 30 Sep 77.

DOT-HS-4-00897 Mod. 4

IMPACT OF RECENT CHANGE IN HIGHWAY SAFETY ENVIRONMENT

An investigation of the effect of the information source upon estimates of safety belt effectiveness shall be performed. This task will involve the following procedures: analyze and compare belt effectiveness estimates using three different sources of information about belt usage available from the Restraint Systems Evaluation Project, examine estimates based upon several competing measures of injury severity, and derive exact confidence intervals that take into account the varying sampling fractions. An investigation of the effect of using a "towaway" criterion for sampling motor vehicle accidents shall be performed. This task will determine potential biasing effects of the towaway criterion upon accident and injury rates, upon assessment of effectiveness of safety measures such as belts and upon the observed distributions of accidents by their more important characteristics such as type and size of vehicles, location of crash, number of vehicles, etc. Methodology shall be improved and information shall be updated on vehicle crashworthiness by make and model. This task will involve using the most recent accident data available to revise and update previous Highway Safety Research Center (HSRC) studies on relative crashworthiness of vehicles by make and model, and will involve revising the methodology so that two car classes can be directly compared, rather than compared to a reference group. Finally, the methodology for determination of significant effects shall be improved and extended; statistical strategies shall be developed and assessed. This task will involve applying recently developed statistical methods to reanalyze data previously considered and comparing the results to assess the usefulness and validity of the alternative methods. In particular, the Chi-Squared Automatic Interaction Detection (CHAID) procedure will be utilized. Alternative measures of estimating injury rates and probabilities will also be investigated. non

The Univ. of North Carolina, Highway Safety Research Center, Chapel Hill, NC 27514
Increased $76,891.00
Extended through 30 Sep 78.

DOT-HS-4-00952 Mod. 8

EXPERIMENTAL FIELD TEST OF PROPOSED PEDESTRIAN SAFETY MESSAGES

The experimental field testing of proposed pedestrian safety messages is modified as follows: to conduct a field test in Columbus, Ohio of the alternate version of the Willy Whistle child safety film and TV spots to run through June 1978; to extend the test period in Los Angeles, California to accommodate the additional efforts needed to increase exposure levels of the test materials (test to be extended until 31 December 1977); to extend the test period in Milwaukee, Wisconsin through June 1978 to ensure experimental comparability with the field test effort in Columbus; and to provide reports as follows: San Diego VTM test final report on or about 1 November 1977, Los Angeles final campaign report on or about 1 August 1978, and final report summarizing all project activities and Milwaukee and Columbus test results on or before 31 May 1979; and to extend the test period in San Diego California by two (2) months. on

Dunlap and Associates, Inc., One Parkland Drive, Darien, Connecticut 06820
Increased $99,355.00
Extended through 31 May 79.

DOT-HS-5-01132 Mod. 4

HEAD MODEL INJURY CRITERIA DEVELOPMENT

Additional simulation tests shall be conducted to validate the final version of the finite element head model. Col

Civil Engineering Laboratory, Naval Construction Battalion Center, Port Huenena, California 94043, Attention: J. C. Gomez
Increased $25,000.00
No change.

DOT-HS-5-01160 Mod. 2

MOTORCYCLE ACCIDENT FACTORS AND IDENTIFICATION OF COUNTERMEASURES

Pathological data shall be provided relating to rider head/neck injuries sustained in fatal motorcycle accidents occurring in Los Angeles County, California for a 24-month period; associated safety helmet data shall be collected; and the relationship between rider head/neck injury and safety helmet usage in these fatal accidents shall be determined. 0 of

University of Southern California, University Park, Los Angeles, California 90007
Increased $290,361.00
Extended through 1 Dec 79.

DOT-HS-5-01160 Mod. 3

MOTORCYCLE ACCIDENT FACTORS AND IDENTIFICATION OF COUNTERMEASURES

Exposure data shall be collected to determine the difference between a sample of nonaccident-involved drivers and the study sample of 900 accident-involved drivers by interviewing motorcycle drivers at, at least, 500 sites of accidents acquired for on-scene, in-depth investigations. In addition, characteristics shall be recorded of all vehicular traffic at the 500 accident sites, matching time of day and day of week as soon as possible after the accident investigation. ty

University of Southern California, University Park, Los Angeles, California 90007
Increased $120,290.00
Extended twenty-eight (28) months from date of contract award (27 Sep 77).

DOT-HS-5-01163 Mod. 7

URBAN CROSSING PROBLEMS

As part of the data analysis activity in the study of urban pedestrian crossing problems, the following additional work shall be performed: review infrequent pattern cases in the National Highway Traffic Safety Administration's (NHTSA) urban pedestrian accident data base file; and perform additional data analyses using videotape, computer file, and hard copy data to provide initial verification of five (5) Potential Accident Causal Types (PACT's). The desired analyses will involve the review of approximately 2,200 hard copy data forms and review of about 1,300 events on videotape. All 379 infrequent type cases from the NHTSA pedestrian accident data base file will be reviewed. 0rt

Applied Science Associates, Inc., P.O. Box 158, Valencia, PA 16059
Increased $11,899.00
Extended through 30 Nov 77.

DOT-HS-5-01192 Mod. 2

HUMAN FACTORS REQUIREMENTS FOR FINGERTIPS REACH CONTROL

Phases 2 and 3 of the original experimental plan for study of human factors requirements for fingertips reach control shall be modified. The data analyses of the Phase 1 experimental tests shall be completed and a report shall be submitted describing the methodology, the results, the conclusions and their supporting justification. In addition, the report shall include an analysis of the relation of the findings to the recently proposed International Standardization Organization (ISO) standards on control location and operation. Based on this analysis as well as on other human factors data, the proposed ISO standards shall be critiqued to point out their human factors inadequacies and to identify any unresolved research questions that need to be answered with additional experiments or analysis. 0 an

Wayne State University, 5050 Cass Avenue, Detroit, Michigan 48202
Increased $9,683.00
Extended to 31 Aug 77.

DOT-HS-5-01215 Mod. 6

RESEARCH SAFETY VEHICLE. PHASE 2

One attendant shall be provided at the New York Auto Show, and second iteration of buck and design change for the research safety vehicle (as outlined in contractor's letter of 1 Apr 1977) shall be provided. 0xpe

Minicars, Inc., 35 La Patera Lane, Goleta, California 93017
Increased $32,207.00
No change.

DOT-HS-6-01307 Mod. 7

ADVANCED RESTRAINTS INTEGRATION AND EVALUATION PROGRAM

An additional sled buck from a Volvo body shell shall be fabricated having interior compartment dimensions identical to the Volvo car and in which production components such as the stock steering column, dash, knee restraint, and windshield can readily be installed; and the advanced RSV (research safety vehicle) restraints already tested in the Advanced Restraints Integration and Evaluation Program shall be integrated into these production components for additional evaluative sled testing. Not covered by this modification is the sled testing to be run with this body buck. Preliminary to integrating the advanced driver air bag restraint into the Volvo steering column/dash structure, it is desirable to know the crush strength of these components. Therefore, a static crush test will be performed in which a torso form will be thrust into the steering column of a stock Volvo on which an air bag is mounted. Deflections of both the steering wheel and the steering column will be measured as independent variables with the dependent variable being the load applied. In addition, a methodology developed by Kinetic Research, Inc., which allows the demonstrated performance of various restraint systems in laboratory tests in specific sized cars to be extrapolated to injury and death reduction in the real world accident spectrum, shall be adapted to the societal benefit analysis already scheduled for this program. It is anticipated that only a small incremental level of effort over and above that originally planned on this program will be required to adapt this methodology. 0 ta

Dynamic Science, Inc., 1850 West Pinnacle Peak Road, Phoenix, Arizona 85027
Increased $16,877.00
Extended to 30 Oct 77.

DOT-HS-6-01326 Mod. 5

FOAMING AGENT

Three sets of flesh parts shall be evaluated in accordance with the procedures used, and for those components tested during the conduct of the contract to include the following: weight measurements of all individual parts, examination for foam fill and foam qualities of all individual parts, determination of foam density of all individual parts, and determination of foam impact response for those parts for which such response was determined during the conduct of the completed portion of the program.

Uniroyal, Inc., Oxford Management and Research, Middlebury, Connecticut 06749
Increased $2,658.00
To be completed by 1 Aug 77.

DOT-HS-6-01340 Mod. 7

SAFETY BELT USAGE SURVEY TRAFFIC POPULATION

Additional computer data analysis shall be conducted to provide safety belt usage data by model year of car and belt usage by observers by type of belt system. 0 in

Kirschner Associates, Inc., 733-15th Street, N.W., Suite 1137, Washington, D.C. 20005
Increased $6,760.00
To be completed by 22 Aug 77.

DOT-HS-6-01346 Mod. 3

MOTOR VEHICLE ACCIDENT INVESTIGATION

All air bag accidents and incidents occurring in the 9-state Far West Region (Washington, Oregon, Idaho, Montana, Wyoming, California, Nevada, Utah, Arizona) shall be investigated upon notification of the accident by the National Highway Traffic Safety Administration (NHTSA) or its authority. In addition, all school bus accidents in the 9-state region in which one (1) or more school bus occupants receive fatal injuries as a result of being transported on the bus or as may be directed by the Government, shall be investigated.

Dynamic Science Inc., 1850 West Pinnacle Peak Road, Phoenix, Arizona 85027
Increased $37,994.00
Extended to 30 Sep 78.

DOT-HS-6-01347 Mod. 3

TREADWEAR VALIDATION

The following movies and slides shall be furnished: a detailed narrative (sound track) film of at least 12 minutes minimum duration depicting the program, including the theoretical and development phase of Contract DOT-HS-4-00920, in terms of objective and results, with the film depicting significant portions of each testing sequence and prepared for educating viewers in the theory and practicability of the accelerated treadwear system and test technique; and a minimum of 75 color slides (35mm) which contain subject matter to serve as an alternative to the subject film. 0n w

Hodges Transportation, Inc., Nevada Automotive Test Center, P.O. Box 234, Carson City, Nevada 89701
Increased $55,777.58
No change.

DOT-HS-6-01348 Mod. 2

UNIFORM TIRE QUALITY GRADING TREADWEAR COURSE

Uniform tire quality grading (UTQG) treadwear course monitoring tests shall be conducted. Each test will involve one standard commercial passenger vehicle utilizing standard original equipment or optional equipment specified for that vehicle and shall be trimmed for wheel weight and balance by only adding ballast to the vehicle. Each test will involve one set of 4 course monitoring tires (CMT's), the tire size also being listed as original and/or optional equipment for the standard vehicle. The actual treadwear test will consist of 16 400-mile circuits (8 runs) for a total of 6,400 miles for one test without break-in mileage. A total of approximately 64,000 vehicle miles are to be run. The tests are to be performed in accordance with the latest issued UTQG regulation and the National Highway Traffic Safety Administration's (NHTSA) Office of Standards Enforcement (OSE) UTQG treadwear test procedure. The purpose of this testing is to provide treadwear course monitoring data for radial, bias belted, and bias tires and to confirm course severity factors and base course wear rates. 0dol

Southwest Research Institute, 8500 Culebra Road, San Antonio, Tex 78284
Increased $23,488.00
To be completed by 30 Sep 77.

DOT-HS-6-01348 Mod. 3

UNIFORM TIRE QUALITY GRADING TREADWEAR COURSE

Treadwear measurements shall be made and data shall be gathered on tires being tested by the Safety Research Laboratory (SRL) at San Angelo, Texas; and uniform tire quality grading (UTQG) treadwear course monitoring tests shall continue to be conducted for the National Highway Traffic Safety Administration's (NHTSA) Office of Standards Enforcement (OSE).

Southwest Research Institute, 8500 Culebra Road, San Antonio, Texas 78284
Increased $5,000.00
To be completed by 30 Sep 77.

DOT-HS-6-01348 Mod. 4

UNIFORM TIRE QUALITY GRADING TREADWEAR COURSE

Uniform tire quality grading (UTQG) treadwear course monitoring tests shall be conducted. Each test will involve one standard commercial passenger vehicle utilizing standard original equipment or optional equipment specified for that vehicle and shall be trimmed for wheel weight and balance by only adding ballast to the vehicle. Each test will involve one set of 4 course monitoring tires (CMT's), the tire size also being listed as original and/or optional equipment for the standard vehicle. The actual treadwear test will consist of 16 400-mile circuits (8 runs) for a total of 6,400 miles for one test without break-in mileage. A total of approximately 728,000 vehicle miles are to be run. The tests are to be performed in accordance with the latest issued UTQG regulation and the National Highway Traffic Safety Administration's (NHTSA) Office of Standards Enforcement (OSE) UTQG treadwear test procedure. The purpose of this testing is to provide treadwear course monitoring data for radial, bias belted, and bias tires and to confirm course severity factors and base course wear rates.

Southwest Research Institute, 8500 Culebra Road, San Antonio, Texas 78284
Increased $267,176.00
To be completed by 30 Sep 78.

NHTSA-7-B724

PUBLIC EDUCATION AND INFORMATION - EMERGENCY MEDICAL SERVICE (EMS) FILM

One 16mm color, optical sound motion picture of 28 1/2 minutes running time, tentatively entitled "Emergency Medical Service," shall be produced. The film is to be of the nature and quality to make it suitable for television broadcasting, although its principal intended audience will comprise public officials and public-oriented citizens who can use the film as an initial guide for judging the adequacy of their own local emergency medical service. To serve this purpose the film must be informative, technically accurate, entertaining, dramatic, and visually and audibly exciting.

Amram Nowak Associates, Inc., 1776 Broadway, New York, New York 10019
$55,999.00
To be completed six (6) months from date of contract award.

NRD-01-4231

NHTSA FACT BOOK MAINTENANCE

Statistical data and information to update the existing NHTSA (National Highway Traffic Safety Administration) FACT BOOK shall be provided; the contents of the FACT BOOK shall be expanded to include additional items of interest to the highway safety community; and the data management methodology developed during Fiscal Year 1977 shall be computerized. The contractor must become familiar with and obtain access to sources of highway safety information, extract data pertinent to motor vehicle and traffic safety and present the data in a format appropriate to the purposes of the FACT BOOK. 0ula

"This contract is awarded by the Small Business Administration under the authority of Section 8(a) of the Small Business Act (USC 637a), and will be administered by the Department of Transportation, National Highway Traffic Safety Administration."
$70,175.00
To be completed twelve (12) months from date of contract award (19 Sep 77).

DOT-HS-7-01730

EVALUATION OF THE IMPACT OF THE TENNESSEE CHILD PASSENGER PROTECTION ACT

An evaluation shall be made of the impact of the Tennessee Child Passenger Protection Act on reducing deaths and injuries to children, under the age of four years, involved in automobile accidents. The project is concerned with the passage of the CRS (child restraint systems) law and CRS usage and is divided into the following three major activity areas: evaluation, public information, and education and management. Within each major activity area are specific tasks concerned with enforcement, adjudication, child restraint systems, child passenger accident records, legislation, advertising, education, support of various groups and organizations, etc. There must be an effective integration of all these activities and tasks to insure the greatest positive impact of the law. In order to accomplish the basic objective, objectives within each activity must also be accomplished. All of the activity objectives are directly related to the project's overall, basic objective of evaluating the impact of the Tennessee Child Passenger Protection Act on reducing deaths and injuries to children, under the age of four years, involved in automobile accidents. spe

State of Tennessee, Office of Urban and Federal Affairs, Highway Safety Planning Division, Suite 950, Capitol Hill Building, 301 Seventh Avenue, North, Nashville, Tennessee 37219
$675,812.00
To be completed thirty-six (36) months from date of contract award (28 Sep 77).

DOT-HS-7-01733

TIME AND MATERIALS TYPE WITH TASK ORDERS FOR CONTACTS WITH MOTOR VEHICLE OWNERS OBTAINING PHOTOGRAPHS AND ACCIDENT REPORTS RELATED TO SAFETY DEFECTS INVESTIGATIONS

Information shall be obtained on motor vehicle accidents which are related to safety defects. Specifically, the objectives of this contract are as follows: determine facts which pertain to the allegations of safety-related defects reported by vehicle owners; interview individuals designated by the National Highway Traffic Safety Administration (NHTSA) as necessary concerning details of possible safety-related defects; in every possible case, examine failed component; and prepare reports for submission to NHTSA's Office of Defects Investigation.

Kappa Systems, Inc., 1501 Wilson Boulevard, Arlington, Virginia 22209
$25,000.00
To be completed one (1) year from date of contract award (26 Sep 77).

DOT-HS-7-01736

SAFETY BELT USAGE IN THE TRAFFIC POPULATION

Safety belt usage shall be observed and recorded in 20 cities for which the National Highway Traffic Safety Administration (NHTSA) has sponsored several safety belt usage studies over the past three years. The cities to be included in the study are New York, Boston, Providence, Pittsburgh, Baltimore, Chicago, Minneapolis-St. Paul, Moorhead (Minnesota), Fargo, Miami, Dallas, Houston, Atlanta, New Orleans, Birmingham, Los Angeles, San Francisco, Seattle, San Diego, and Phoenix. The objective of this contract is to determine the effectiveness of various older as well as newer safety belt systems (warning and hardware systems) in increasing belt usage.

Opinion Research Corporation, North Harrison Street, Princeton, New Jersey 08540
$444,426.00
To be completed thirty-one (31) months from date of contract award (30 Sep 77).

DOT-HS-7-01750

ACCELERATOR CONTROL SYSTEMS

Motor vehicle accelerator control systems shall be tested in accordance with FMVSS No. 124 (National Highway Traffic Safety Administration's (NHTSA) Office of Standards Enforcement (OSE) Laboratory Test Procedure TP-124-02 dated 7 Apr 1976).0 to

Dayton T. Brown, Inc., Church Street, Bohemia, Long Island, New York 11716
Per Delivery Order
To be completed one (1) year from date of contract award (30 Sep 77).

DOT-HS-6-01442 Mod. 1

NATIONAL CRASH SEVERITY STUDY--QUALITY CONTROL

Extensions shall be made to the CRASH2 computer program, and quality control shall be provided for the National Crash Severity Study. In November 1976, the seven field data collection contractors and the National Crash Severity Study began collecting data. Two general problems have arisen which must be corrected and which are the target of this contract modification. The CRASH2 program has been used extensively by the field teams. This field utilization has identified a number of relatively simple but important changes that should be made for the purposes of making the results accurate and making the program convenient to the users. In concert with the use of the CRASH2 program for reconstruction, problems in the field measurement of data have been identified in field visits by the quality control contractor and by NHTSA (National Highway Traffic Safety Administration) contract managers. The measurement problems are translated into coding errors and inaccuracies in the output of the CRASH2 program. 0t a

Calspan Corporation, 4455 Genesee Street, Erie County, Buffalo, New York 14221
Increased $85,633.00
To be completed by 28 Feb 78.

DOT-HS-6-01451 Mod. 3

DEVELOPMENT OF A VISIBILITY DESIGN

Upon receipt of approval of the Task 1 Report and NHTSA (National Highway Traffic Safety Administration) identification of the technical approach to be followed, two sets of Performance Specifications shall be prepared that define in detail the operational performance requirements of the best short-term solution and the best long-term solution to the design of a visibility research capability. (This is a modification of Task 2 of basic contract.)

The Regents of the University of California, 405 Hilgard Avenue, Murphy Hall, Room 310, Los Angeles, California 90024
Increased $2,500.00
Extended to 5 Aug 77.

DOT-HS-6-01453 Mod. 1

PROVISION OF PEDESTRIAN AND BICYCLIST DATA

The following additional work shall be accomplished: convene a panel of pedestrian safety experts for the purpose of reaching agreement on accident-type definitions as a basis for structuring the retrospective manual; reschedule the pilot testing and former test activities; and extend collection of supplemented pedestrian accident reports from the data base cities of Akron, Toledo, Columbus, and San Diego, through June 1978 (including collection and processing of data, and preparation and submission of quarterly, annual and final data summary reports). In addition, a computer program is to be developed and tested, which will automatically generate accident types from data provided from supplemented accident reports as is currently done manually.

Applied Science Associates, Inc., P.O. Box 158, Valencia, Pennsylvania 16059
Increased $33,706.00
Extended to 31 Mar 79.

DOT-HS-6-01457 Mod. 3

MAINTENANCE COMPARISON ON FMVSS NO. 121 CONFIGURED VEHICLES VERSUS NON 121 CONFIGURED VEHICLES

As part of a study to compare maintenance on FMVSS-121-configured vehicles and non-121-configured vehicles, the following shall be accomplished: add an appendix to the final report stating for each user in the sample, the number of vehicles which they operate, and the region of the country from which they operate (i.e., Northeast USA, Mid-Atlantic USA, etc.). In order to assess the effects of the national 55 mph speed limit (imposed November 1974), there shall be provided, as part of the accident analysis, a table with all vehicles, all observed miles, all accidents, broken down at 25,000-mile intervals and a table with the same format as above, but deleting all observed miles and all accidents that occurred prior to November 1974. A statement shall be added to the report relating to warranty and recall repairs. This shall include results of conversations with representatives of the fleets represented in the study as they relate to warranty and recall repairs. 0she

Burlington Fleet Services, Burlington Industries, Inc., Post Office Box 21207, Greensburo, Gullford, North Carolina 27420
No change
No change.

DOT-HS-6-01461 Mod. 1

OPTIMIZATION OF STATE ACCIDENT DATA BASES

The DART system at the Delaware installation shall be revised and brought into conformance with the DART system that is being installed in the other seven states receiving this software package. This is essential to make the system receptive to any updates that will be developed and distributed to DART users. This is especially true for the OMNITAB component of DART

since future revisions will assume that a standard system exists at all sites.eff

Genasys Corporation, One Central Plaza, 11300 Rockville Pike, Rockville, Maryland 20852
Increased $6,338.00
Extended to 11 Nov 77.

DOT-HS-6-01467 Mod. 1

CRITICAL TASK INTERLOCK UNITS

The complete testing of the additional four critical task interlock units shall be accomplished.

Systems Technology, Inc., 13766 South Hawthorne Blvd., Hawthorne, CA 90250
Increased $2,960.00
Extended through 31 Oct 77.

DOT-HS-6-01470 Task Order 1

EVALUATION OF OCCUPANT PROTECTION DEVICES

Three additional head-on, car-to-car crash tests shall be conducted, and two (2) prints of the 16 mm film coverage of specific tests run under Task Order 1 of Contract DOT-HS-6-01470 and Task Order 4 of Contract DOT-HS-5-01017 (run numbers 261, 262, 273, 301, 341, 342; and 343, 344, 346, 347, and 353) shall be provided. 0rib

Calspan Corporation, Post Office Box 235, Buffalo, New York 14221
$45,311.00
No change.

DOT-HS-6-01479 Mod. 1

MATERIAL APPLICATION IN FUTURE AUTOMOTIVE STRUCTURES

In a study of material application in future automotive structures, the following additional tasks shall be accomplished: repeat Task 6 for intermediate-sized vehicles in the 3,600 to 4,000-pound weight range (the selected vehicle to be a six-passenger, family-sized sedan); repeat Task 7 for design concepts developed in Task 8; and using data generated in Tasks 6-9, prepare specifications for the major structural components for both size vehicles. After CTM approval, the specifications shall be submitted to material supplier companies for their review and proposal of a design program, and after CTM approval, subcontracts shall be awarded to a limited number of these suppliers who will utilize their expertise as the primary material of construction in meeting the component specification requirements. 0 sh

The Budd Company, 300 Commerce Drive, Fort Washington, Pennsylvania 19037
Increased $298,120.00
Extended through 30 Mar 78.

DOT-HS-6-01510 Mod. 1

MOTOR VEHICLE INSPECTION DEMONSTRATION STUDY

As part of the Motor Vehicle Inspection Demonstration Study, Task 3 is changed to read as follows: "after identifying appropriate field situations where such a plan can be tested, the Contractor will conduct evaluations at separate sites in three different states, or on a sound comparative basis within the state."

Applied Science Associates, Inc., P.O. Box 158, Valencia, Butler County, PA 16058
Increased $5,798.00
No change.

DOT-HS-6-01514 Mod. 1

EVALUATION OF TEST DUMMY'S FLESH PARTS

Calibration and sled tests shall be conducted in an evaluation of anthropomorphic test dummies. Head and neck tests shall be performed as specified in paragraphs 572.6 and 572.7, respectively, Notice 04, Part 572 - Anthropomorphic Test Dummy Regulation, dated February 7, 1977. This will include testing of four (4) dummies, requiring only one head and head-neck test for each dummy if the prescribed criteria are met. Otherwise maximum three (3) repeated tests will be required. Thirty-six (36) acceptable sled tests shall be conducted to include the following: completion of additional sled testing (ten (10) sled tests) so that each dummy (four (4) with Nitrosan and two (2) each with Compounds A and B flesh parts) has been tested in a prescribed number of replicate tests (will involve testing of two (2) each Humanoid dummies with Nitrosan and Compound B flesh parts in three (3) replicate tests in preinflated air bag and two (2) replicate tests in steering wheel configurations); comparative testing of two (2) dummies from the same manufacturer having Nitrosan and substitute-compound-produced flesh parts (will involve sixteen (16) sled tests so that a total of three (3) replicate tests are obtained for each dummy with Nitrosan and with substitute parts in 3-point belt and air bag configurations, and two (2) replicate tests in steering wheel configurations); and performance of ten (10) sled tests in 30° frontal impacts with two (2) dummies having flesh parts made with substitute foaming compound to include five (5) replicate tests in 3-point belt and five (5) in preinflated air bag configurations).

Calspan Corporation, 4455 Genesee Street, Buffalo, New York 14221
Increased $63,888.00
To be completed by 15 Aug 77.

DOT-HS-6-01515 Mod. 1

PRESENTENCE INVESTIGATION TRAINING: MATERIAL DEVELOPMENT AND SEMINARS

An eight (8)-hour instruction program on pre-sentence investigation shall be developed and conducted for the American Academy of Judicial Education in November 1977. Ant

Applied Science Associates, Inc., Box 158, Valencia, Butler County, Pennsylvania 16059
Increased $19,021.00
Extended to 30 Nov 77.

DOT-HS-7-01776

LONG LIFE BRAKE SYSTEMS

With respect to generating durability standards for inclusion in FMVSS 105-75, an analysis shall be made of the state of the art of hydraulic brake systems to identify system assembly and/or component design requirements which will assure a significant increase in service life without maintenance and repairs, and without affecting safety, performance or fuel economy; techniques shall be developed which can be utilized objectively in quantifying system durability and procedures suitable for use in compliance testing shall be recommended. The number of motor vehicles on the road has doubled in the last 20 years, but the number of qualified repair mechanics to service these vehicles has not kept pace, placing an increased burden on the existing qualified mechanics. The National Highway Traffic Safety Administration (NHTSA) believes that a decrease in accidents resulting from brake system failure is achievable if system performance can be maintained by redesign for a significant increase in service life between maintenance/repair periods from that presently available.

Science Applications, Inc., 1801 Avenue of the Stars, Suite 1205, Los Angeles, California 90067
$148,545.00
To be completed twelve (12) months from date of contract award (30 Sep 77).

DOT-HS-6-01777

ELECTRICAL SYSTEM INTEGRITY

An analysis shall be made of motor vehicle electrical systems and components for design and/or maintenance inadequacies that lead to malfunction/failure of critical subsystems; and cost-effective countermeasures shall be developed to improve the service life of those electrical systems and components with high failure frequencies and electromagnetic effects on fuel injection, lean burn and microprocessor-equipped vehicles. Based on studies showing starting/charging system and ignition system failures as leading causes of vehicle disablement and automobile breakdowns as responsible for a significant portion of the national highway fatality and injury picture, the National Highway Traffic Safety Administration (NHTSA) is examining the possibility of proposing new standards which will specify performance requirements to ensure reliable and fail-safe operation of critical electrical systems and components on all motor vehicles.0tem

Atlantic Research Corporation, 5390 Cherokee Avenue, Alexandria, Virginia 22314
$191,791.00
To be completed twelve (12) months from date of contract award (30 Sep 77).

DOT-HS-7-01778

IMPACT OF FUEL EFFICIENT VEHICLES ON THE CONSUMER

A study shall be undertaken to estimate the effects on consumer lifestyles and vehicle usage patterns of alternative passenger and nonpassenger automobiles designed to meet given fuel standard levels. The results will help the National Highway Traffic Safety Administration (NHTSA) evaluate secondary and tertiary effects of alternative fuel economy standards. The study shall include a state-of-the-art literature analysis of consumer behavior towards vehicle fuel economy attributes, a review of automobile price and operating cost relationships, a quantification of consumer impacts from Class I and II Fuel Economy Options, and information on general consumer impacts. ctu

Charles River Associates Incorporated, 1050 Massachusetts Avenue, Cambridge, MA 02138
$183,758.00
To be completed by 31 Mar 79.

DOT-HS-7-01779

CONSUMER BEHAVIOR TOWARDS FUEL EFFICIENT VEHICLES

A study shall be undertaken to estimate the likely consumer acceptance of alternative passenger and nonpassenger automobiles designed to meet given fuel economy standards. The results will help the National Highway Traffic Safety Administration (NHTSA) evaluate secondary and tertiary effects of alternative fuel economy standards. The study shall include a state-of-the-art literature analysis of consumer behavior towards vehicle fuel economy attributes, data on consumer awareness of vehicle fuel efficiency issues and on consumer decisions to postpone purchasing or shift market class, and data on consumer decisions to purchase nonpassenger automobiles.

Charles River Associates, Inc., 1050 Massachusetts Avenue, Cambridge, MA 02138
$158,552.00
To be completed by 31 Mar 79.

DOT-HS-7-01780

CONSUMER BEHAVIOR TOWARDS FUEL EFFICIENT VEHICLES

A study shall be undertaken to estimate the likely consumer acceptance of alternative passenger and nonpassenger automobiles designed to meet given fuel economy standards. The results will help the National Highway Traffic Safety Administ

tration (NHTSA) evaluate secondary and tertiary effects of alternative fuel economy standards. The study shall include a state-of-the-art literature analysis of consumer behavior towards vehicle fuel economy attributes, data on consumer awareness of vehicle fuel efficiency issues and on consumer decisions to postpone purchasing or shift market class, and data on consumer decisions to purchase nonpassenger automobiles.

Cambridge Systematics, Inc., 238 Main Street, Cambridge, Mass. 02142
$210,251.00
To be completed by 31 Mar 79.

DOT-HS-7-01781

CONSUMER BEHAVIOR TOWARDS FUEL EFFICIENT VEHICLES

A study shall be undertaken to estimate the likely consumer acceptance of alternative passenger and nonpassenger automobiles designed to meet given fuel economy standards. The results will help the National Highway Traffic Safety Administration (NHTSA) evaluate secondary and tertiary effects of alternative fuel economy standards. The study shall include a state-of-the-art literature analysis of consumer behavior towards vehicle fuel economy attributes, data on consumer awareness of vehicle fuel efficiency issues and on consumer decisions to postpone purchasing or shift market class, and data on consumer decisions to purchase nonpassenger automobiles. 0.

Market Facts, Inc., 1201 Connecticut Ave., N.W., Washington, D.C. 20036
$93,427.00
To be completed by 31 Mar 79.

DOT-HS-7-01782

CONSUMER BEHAVIOR TOWARDS FUEL EFFICIENT VEHICLES

A study shall be undertaken to estimate the likely consumer acceptance of alternative passenger and nonpassenger automobiles designed to meet given fuel economy standards. The results will help the National Highway Traffic Safety Administration (NHTSA) evaluate secondary and tertiary effects of alternative fuel economy standards. The study shall include a state-of-the-art literature analysis of consumer behavior towards vehicle fuel economy attributes, data on consumer awareness of vehicle fuel efficiency issues and on consumer decisions to postpone purchasing or shift market class, and data on consumer decisions to purchase nonpassenger automobiles. 0e N

National Analysts, A Division of Booz, Allen and Hamilton, Inc., 400 Market Street, Philadelphia, PA 19106
$141,816.00
To be completed by 31 Mar 79.

DOT-HS-7-01783

CORPORATE STRATEGIES OF AUTOMOTIVE MANUFACTURERS

Means for assessing the corporate decision-making process for domestic and foreign automotive manufacturers shall be developed. The study will identify and assess possible product planning, marketing, manufacturing, engineering and financial strategies which domestic and foreign auto manufacturers might adopt in response to the marketplace, and to Federally-mandated automotive fuel economy standards and other government policies such as a gasoline tax or an automotive excise tax. 0ibu

Harbridge House, Inc., 11 Arlington Street, Boston, Massachusetts 02116
$439,056.00
To be completed by 31 Mar 79.

DOT-HS-7-01784

CORPORATE STRATEGIES OF AUTOMOTIVE MANUFACTURERS

Means for assessing the corporate decision-making process for domestic and foreign automotive manufacturers shall be developed. The study will identify and assess possible product planning, marketing, manufacturing, engineering and financial strategies which domestic and foreign auto manufacturers might adopt in response to the marketplace, and to Federally-mandated automotive fuel economy standards and other government policies such as a gasoline tax or an automotive excise tax.

The Futures Group, Inc., 124 Hebron Avenue, Glastonbury, Connecticut 06033
$213,240.00
To be completed by 31 Mar 79.

DOT-HS-7-01785

INJURY STUDY OF THE FEMUR-PELVIC COMPLEX IN AUTOMOBILE CRASH ENVIRONMENT

A study to obtain a comprehensive and useful knowledge of the impact injuries sustained in the femur-pelvic complex resulting from traffic accidents of both frontal and side/lateral collisions shall be conducted. This knowledge is to be obtained by conducting controlled laboratory experiments using human surrogates (anthropometric dummies and human cadavers) to simulate the statistically representative real-life accidents. The components of the femur-pelvic complex under study will include the knee, thigh (femur), hip and pelvis. In order to achieve an optimal decision for a possibly much more efficient restraint system utilizing the knees in lieu of, or in conjunction with, lap belts which have recently been replaced in passive restraint systems by knee bars or knee bolsters, a more complete and detailed knowledge of injury mechanisms and injury tolerances of the lower extremity complex must first exist.

Wayne State University, Research and Sponsored Programs Services, 5050 Cass, Detroit, Michigan 48202
$346,271.00
To be completed by 31 Mar 80.

DOT-HS-7-01786

IMPACT OF AUTOMOTIVE FUEL ECONOMY STANDARDS ON COMPETITION IN THE AUTOMOTIVE INDUSTRY

Means for assessing competition in domestic and foreign automotive corporations shall be developed; and identification and assessment shall be made of the impacts on competition in response to the marketplace, and to Federally-mandated automotive fuel economy standards in combination with alternative government policies such as a gasoline tax or an automotive excise tax.

Charles River Associates Incorporated, 1050 Massachusetts Avenue, Cambridge, MA 02138
$190,025.00
To be completed by 31 Mar 79.

DOT-HS-7-01787

IMPACT OF AUTOMOTIVE FUEL ECONOMY STANDARDS ON COMPETITION IN THE AUTOMOTIVE INDUSTRY

Means for assessing competition in domestic and foreign automotive corporations shall be developed; and identification and assessment shall be made of the impacts on competition in response to the marketplace, and to Federally-mandated automotive fuel economy standards in combination with alternative government policies such as a gasoline tax or an automotive excise tax.0mot

A. T. Kearney, Inc., 1800 M Street, N.W., Washington, D.C. 20036
$212,358.00
To be completed by 31 Mar 79.

DOT-HS-7-01788

TECHNOLOGICAL ADVANCEMENTS AND APPLICATIONS (POLICE TRAFFIC SERVICES)

A study of how to reduce the delay between the discovery of new devices and technologies and their application by the police traffic law enforcement community to make the delivery of police traffic services more expeditious and efficient shall be made. This project will provide a continuous review of new devices, equipment, procedures, techniques and methods, or other technological advances being made in the private, business, industrial and military sectors. This review should include, but not be limited to, regular monitoring and review of the various trade journals; reading of scientific papers delivered at professional meetings; consultation with professional police organizations, such as the International Association of Chiefs of Police; consultation with the National Highway Traffic Safety Administration (NHTSA), Research and Development component; examination of patents applied for and issued; and literature searches through the NHTSA Technical Reference Service. When the contractor identifies an advancement which appears to have a police traffic law enforcement application, the contractor will screen the devices or techniques for nomination to the Technical Panel. The Technical Panel will examine all of the nominated devices and techniques thoroughly. Those advancements that have been determined to have potential for improving police traffic services will then be recommended for future feasibility studies. 0tit

Dunlap and Associates, One Parkland Drive, Darien, Connecticut 06820
$50,176.00
To be completed twelve (12) months from date of contract award.

DOT-HS-7-01789

AUGMENTATION OF RESEARCH AND ANALYSIS CAPABILITIES FOR TIMELY SUPPORT OF AUTOMOTIVE FUEL ECONOMY ACTIVITIES

Research and analysis support shall be provided for evaluation of questions arising out of the implementation of automotive fuel economy standards. Research and analysis capabilities shall be provided in specific areas of expertise applicable to the assessment of automotive technology, industry analysis, manufacturer's strategies and risks, marketing and economics.

Corporate-Tech Planning, Inc., 275 Wyman Street, Waltham, Massachusetts 02154
$297,011.00
To be completed by 30 Sep 78.

DOT-HS-7-01790

AUGMENTATION OF RESEARCH AND ANALYSIS CAPABILITIES FOR TIMELY SUPPORT OF AUTOMOTIVE FUEL ECONOMY ACTIVITIES

Research and analysis support shall be provided for evaluation of questions arising out of the implementation of automotive fuel economy standards. Research and analysis capabilities shall be provided in specific areas of expertise applicable to the assessment of automotive technology, industry analysis, manufacturer's strategies and risks, marketing and economics.

South Coast Technology, Inc., P.O. Box 3265, Santa Barbara, California 93105
$249,033.00
To be completed by 30 Sep 78.

DOT-HS-7-01792

THE RESPONSE OF HUMAN SURROGATES IN AIR BAG/STEERING COLUMN SYSTEMS

The kinematics and injury patterns shall be studied for human surrogate test subjects when restrained by a combination air bag/collapsible steering column restraint system being developed by NHTSA (National Highway Traffic Safety Administration) as a means of providing crash protection to the occupants of subcompact cars. The kinematics will be compared to that of anthropomorphic dummies tested in identical crash environments with the same restraint system. Data resulting from these tests will provide insight into the relationship between chest and head-neck responses and injury level in the specialized crash environment under study. In addition,

it is intended that the kinematic data will provide a basis for improving dummy design, if that should prove necessary. 0tio

Wayne State University, Research and Sponsored Program Services, 5050 Cass, Detroit, Michigan 48202
$171,024.00
To be completed by 30 Sep 78.

DOT-HS-7-01656

IMPROVEMENT OF NARROW OBJECT ACCIDENT RECONSTRUCTION

The following tasks shall be accomplished under this contract: make necessary changes in the Simulation Model Automobile Collision (SMAC) - Narrow Object Plotting routine so that the plots retain all the working features of the original SMAC plots; provide expert advice to the users of the Narrow Object Simulation Program (NOSP) at Southwest Research Institute (SWRI); execute ten narrow object accident cases, supplied by SWRI, using the NOSP (evaluate accuracy of the NOSP by comparing simulated output with corresponding field data, inaccuracies to be documented and corrected); provide data for each of the three staged collisions run under the contract "Improvement of Accident Simulation Model"; for all final runs using the NOSP, explain the reason for using all inputs and the reason for being satisfied with the outputs; provide an annotated bibliography of all staged collision work done at Texas Transportation Institute (TTI) that is relevant to single vehicle impacts with off-road objects; and provide a film of the three staged collisions run under the contract "Improvement of the Accident Simulation Model". 0he

Texas A and M Research Foundation, F. E. Box H, College Station, Texas 77843
$14,000.00
To be completed three (3) months from date of contract award (7/29/77).

DOT-HS-4-00955 Mod. 4

EXPERIMENTAL FIELD TEST OF PROPOSED ANTI-DART-OUT TRAINING PROGRAMS

As part of the experimental field tests of proposed anti-dart-out training programs, seven additional months of child pedestrian accident data for New Orleans shall be compiled. This process shall include obtaining copies of relevant accident reports through Dunlap and Associates, verifying the school enrollment of each victim with the New Orleans public schools, and retrotyping the reports. Data shall be compiled for the period January 1 through July 31, 1977. 0y o

Applied Science Associates, Inc., Box 158, Valencia, Butler County, Pennsylvania 16059
Increased $9,142.00
Extended to 30 Sep 77.

DOT-HS-5-01036 Mod. 5

DIAGNOSTIC MOTOR VEHICLE INSPECTION DEMONSTRATION PROJECTS PROGRAM EVALUATION SUPPORT

Increased efforts shall be made as part of program evaluation support for the Diagnostic Inspection Demonstration Projects by accessing current data and conducting correlations and analyzing relationships between vehicle mileage and defects. Program developments have produced prime interest in the analysis of the relationship between specific vehicle subsystem defects, year of manufacture, and odometer reading. The work shall be accomplished in the following four steps: establish study objectives and design statistical experiment, create data file, apply statistical programs, and analyze results and prepare report.0ont

Computer Sciences Corporation, Systems Division, 6565 Arlington Boulevard, Falls Church, Virginia 22046
Increased $14,640.00
Extended to 4 Aug 77.

DOT-HS-5-01060 Task Order 13

SOURCE DOCUMENT DATA CONVERSION FOR THE FATAL ACCIDENT REPORTING SYSTEM (FARS KEYPUNCHING)

Source document data shall be keypunched for the National Highway Traffic Safety Administration's (NHTSA) Fatal Accident Reporting System (FARS). In participating in FARS, each state submits to NHTSA a case for each traffic accident in which a fatality occurred. The contractor shall pick up from NHTSA a batch of cases two to four times each month. The monthly volume will vary from 14,850 to 75,000 documents or 15,000 to 75,750 cards. The average number of key strokes per cards is 63. Cases will be grouped by state within the batches. One-hundred percent of the data shall be keypunched and verified. Keypunching shall be done in accordance with provided instructions. The finished product will be a card image formatted, 9-track, 1600 bpi unlabeled tape.

Institute of Modern Procedures, 1430 K Street, N.W., Suite 600, Washington, D.C. 20005
$53,544.64
To be completed by 21 Feb 78.

DOT-HS-5-01060 Task Order 14

DATA CONTROL FOR FATAL ACCIDENT REPORTING

Data control/quality control shall be provided for the National Highway Traffic Safety Administration's (NHTSA) Fatal Accident Reporting System (FARS). The service of one (1) data control clerk shall be provided for logging and editing input data prior to keypunch and for subsequent quality control to analyze and eliminate data conversion errors prior to processing.

Institute of Modern Procedures, 1430 K Street, N.W., Suite 600, Washington, D.C. 20005
$18,330.40
To be completed by 21 Feb 78.

DOT-HS-5-01121 Mod. 8

TRAFFIC LAWS ANNOTATED. PART 9

The following shall be accomplished: research, prepare and deliver to the National Highway Traffic Safety Administration (NHTSA) 150 copies of the agenda to be used by the National Committee on Uniform Traffic Laws and Ordinances in conjunction with the National Committee's plenary meetings to be held in mid-1978 to consider and vote on prospective revisions to the Uniform Vehicle Code (UVC) and the Model Traffic Ordinance (MTO). The national agenda will contain all proposed revisions to existing provisions in the Code as received by the National Committee from private and public sources, including the NHTSA, and considered by the six subcommittees of the National Committee during 1977 and 1978. The agenda shall contain summaries of state traffic laws comparable to each proposed revision, the rationale supporting each proposal, the effect of the expected code change, and any reports and recommendations prepared for the subsequent consideration of the full membership of the National Committee. th

National Committee on Uniform Traffic Laws and Ordinances, 1776 Massachusetts Avenue, N.W., Washington, D.C. 20036
Increased $15,000.00
No change.

DOT-HS-5-01141 Mod. 2

ALCOHOL HIGHWAY SAFETY LEGISLATIVE INFORMATION SYSTEM

The following four tasks shall be accomplished: supply a full text printout (State of the Law Reference) of all statutes relating to the Alcohol-Drug and Highway Safety subjects enumerated in the representative source list (RSL) of all fifty (50) states, as such laws are enacted from January 1, 1977, through December 31, 1977; at the end of the calendar year 1977, update the State of the Law Manual and index, the manual to incorporate all 1977 legislation of all jurisdictions referenced in the above task which relate to the descriptors contained in the RSL and to contain all relevant legislation that becomes law through December 31, 1977; expand the 1976 RSL by the addition of ten (10) new legal categories of current TSP program interests, the categories to be incorporated within the obligatory responsibilities of the first two tasks; and create and develop charts and graphs of the 1976 and 1977 collection of legal information relating to alcohol, drugs and highway safety (the graphs and charts to be accompanied by a descriptive and/or trend analysis in narrative form).

Aspen Systems Corporation, 11600 Nebel Street, Rockville, Maryland 20852
Increased $24,870.41
To be completed by 15 Mar 78.

DOT-HS-5-01253 Mod. 6

SURVEY ANALYSIS OF SHORT TERM APPROACHES TO THE REHABILITATION OF CONVICTED DWI'S

Rehabilitation techniques developed and outlined in the Appendix of Phase 1 of this contract (Report No. DOT-HS-802-055) shall be expanded, and appropriate instructional materials and manuals suitable for use by therapists for conducting treatment sessions for convicted DWI's (driving under the influence) shall be produced. Treatment procedures will be directed towards DWI's who have a limited drinking problem and those who have a substantial drinking problem.ref

McBer and Company, 137 Newbury Street, Boston, Massachusetts 02110
Increased $41,149.20
Extended to 28 Feb 78.

DOT-HS-5-01263 Mod. 6

SAFE PERFORMANCE CURRICULUM PERFORMANCE MEASURES

The reliability of the Safe Performance Curriculum (SPC) on the-road performance test shall be determined, and suppor shall be provided for the SPC Demonstration Project. The re liability task shall involve administering the SPC test (test an retest) to 50 novice and 50 experienced drivers, determinin reliability coefficients, determining the relationship betwee the experienced and novice groups for both test administra tions, providing raw frequencies of each maneuver within th test for both groups and each test administration, and con sidering methods for determining some type of driver "deman index". The project support task shall involve assisting person nel at the demonstration site in the construction of four (4 test routes, determining procedural problems associated wit the size of vehicle and height of coder, and estimating wha problems (if any) will be associated with conducting the on the-road test in the rain.

University of Southern California, Institute of Safety and Systems Management, Traffic Safety Center, Los Angeles, California 90007
Increased $24,287.00
Extended to 28 Feb 78.

DOT-HS-6-01285 Mod. 4

ADMINISTRATIVE ADJUDICATION

Computerized driver records from the North and Sout Dakota and New York test sites shall be acquired in order t determine adjudication system effectiveness. Necessary com puter programs and computer process shall be developed, an the collected effectiveness and fairness data analyzed. Collec tion of fairness data as described in modification number thre of this contract shall be continued. 0iab

PRC Systems Sciences Company, 7600 Old Springhouse Rd., McLean, VA 22101
Increased $9,789.00
No change.

DOT-HS-6-01286 Mod. 3

FLEET ACCIDENT EVALUATION OF FMVSS 121

As part of a nationally representative data collection systen established by the Highway Safety Research Institute cur rently involving approximately 550 motor carrier fleets, th

following tasks shall be accomplished: increase sample size through reduction in stalled fleets; continue the FARS (Fatal Accident Reporting System) follow-up on fatal accidents involving late-model air-braked trucks to completion, thereby generating the required information on approximately 1400 fatal accidents over the two calendar years 1976-1977; monitor post-Notice-7 (of FMVSS 121) vehicles in the fleets in the data collection program, and collect maintenance data from 1975 records for pre-standard FMVSS 121 vehicles

The Regents of the University of Michigan, 260 Research Administration Building, Ann Arbor, Michigan 48105
Increased $98,620.00
Extended to 30 Jun 78.

DOT-HS-6-01307 Mod. 6

PASSIVE SMALL CAR RESTRAINT SYSTEMS

As part of an evaluation of passive restraint systems in small cars, the following modifications shall be made to the study: modify instrumentation requirements for Vehicle Crash Test Nos. 8 through 17 to include triaxial accelerometers on the front crossmember, engine, and rear axle of each vehicle (data to be reduced and presented as required by the original contract); and take interior profile measurements of certain compartments of a selected small vehicle model, the measurements to be presented in a manner that they can be compared to the Calspan profiles already in the contractor's possession.0MVS

Dynamic Science, Inc., 1850 West Pinnacle Peak, Phoenix, Arizona 85027
Increased $18,996.00
No change.

DOT-HS-6-01365 Task Order 3

MULTIVARIATE MODELING AND ANALYSIS

Utilizing the AIS (abbreviated injury scale) injury predictive function developed under NHTSA (National Highway Traffic Safety Administration) Contract No. DOT-HS-4-00882 (Nonlinear Multivariate Modeling of Head Injury), a study shall be conducted to determine that form of acceleration time history which accelerates a head from zero velocity to a specified velocity V in a distance D which produces a minimum AIS.

ADAPTRONICS, Inc., Westgate Research Park, 7700 Old Springhouse Road, McLean, Virginia 22101
$7,976.84
To be completed one-hundred and ninety (190) days from date of task order award (16 May 77).

DOT-HS-6-01367 Mod. 3

DEVELOPMENT OF CALIBRATION AND TEST PROCEDURES FOR THREE-YEAR-OLD COMPLIANCE TEST DUMMY

A concepted compliance test dummy (three-year-old size) calibration procedure shall be examined and verified via independent testing, and on the basis of these tests, a finalized and validated calibration test procedure shall be provided. Based on an analysis of the test data, the test procedures, etc., a final set of recommendations of test equipment, test procedures and performance criteria the child dummy should meet in its qualification tests before it becomes acceptable for evaluation of child restraint systems, shall be prepared.

The University of Michigan, Div. of Research and Development Admin., Research Admin. Bldg. - North Campus, Ann Arbor, Michigan 48105
Increased $9,740.00
To be completed by 1 Jan 78.

DOT-HS-6-01381 Mod. 1

MOTORCYCLE HANDLING

The following additional tasks shall be accomplished in a motorcycle handling study: specify, design, fabricate and assemble, check out, and develop an improved instrumentation package suitable for data conditioning and recording in safety-related, full-scale motorcycle handling tests; and assess the handling and braking properties of a motorcycle fitted with an antilock braking system, via full-scale experiments with an expert test rider.

Systems Technology, Inc., 13766 S. Hawthorne Boulevard, Hawthorne, California 90250
Increased $37,835.00
Extended through 22 Dec 77.

DOT-HS-6-01395 Mod. 3

SAFETY HELMET PERFORMANCE INVESTIGATION

The following additional tasks in a safety helmet performance investigation shall be accomplished: modify a set of Cragar headform sizes A, B, C and D in such a way that the center of gravity of the combined Cragar headform and SWRI (Southwest Research Institute) aluminum pistol grip will be at location of the accelerometer at the center of the ball of the pistol grip; and perform vibration tests for the cases where the A, B, C and D Cragar headforms are mounted in the same manner as the size C headform was tested under Task 2.

Southwest Research Institute, 8500 Culebra Road, San Antonio, TX 78284
Increased $6,000.00
Extended to 31 Aug 77.

DOT-HS-6-01407 Mod. 2

WINDSHIELD WASHER PROCEDURE AND SPRAY

The validity of four different road dirt films (solution of Docket 69-19, Notice 3; solution 8F of the SWRI (Southwest Research Institute) Report AR1150; solution specified by ECE; and solution specified by SAE) for use in testing of headlamp washers shall be compared and determined. Various designated photometric test points previously used to test headlamp washers shall be recorded and analyzed and test

DOT-HS-6-01412 Mod. 2

SMALL CAR DRIVER INFLATABLE RESTRAINT SYSTEM EVALUATION

Sled runs shall be completed using selected small vehicle model sled bucks to evaluate a standard air bag assembly in protecting 95th-percentile male and 5th-percentile female dummies.0ied

Minicars, Inc., 35 La Patera Lane, Goleta, California 93017
Increased $73,966.00
To be completed by 31 May 78.

DOT-HS-6-01419 Mod. 1

INSTRUCTOR TRAINING FOR NEWLY REVISED CURRICULUM

The following shall be added to Task 1: in the case of the EMT (emergency medical technician)--Ambulance Course (Revised) and for the purpose of determining and describing a set of slides for use in a course to train instructors (Task 2), analyze and evaluate the contents of the 1971 publication for EMT--Ambulance instructor training (PB 238 672) as well as the revision in process under Contract No. DOT-HS-6-01419. The following shall be added to Task 2: in the case of the EMT--Ambulance Course (Revised), plan and describe a master set of 2x2 35 mm slides for use by an instructor-trainer in the training of EMT instructors. The following shall be added to Task 3: in the case of the EMT--Ambulance Course (Revised), orientate the instructor-trainer to the specific teacher training course materials in Task 2. 0 pr

Dunlap and Associates, Inc., One Parkland Drive, Darien, Connecticut 06820
Increased $15,668.00
Extended to 31 Dec 77.

DOT-HS-6-01420 Mod. 2

ANTICIPATION OF FUTURE MOTOR VEHICLE SAFETY

Expansion shall be undertaken of the basic program for development of a technique for anticipating future motor vehicle safety problems to include dynamic models which forecast future changes in the motor vehicle transportation system elements, human exposure, motor vehicle operations and highway networks.0ion

Minicars, Incorporated, 35 LaPatera Lane, Goleta, California 93017
Increased $51,760.00
Extended to 30 Jun 78.

(Phoenix, Arizona); to remove monorail through the center of the rollover pad and replace with concrete; and to conduct an additional 90° rollover test.

Dynamic Science, Inc., 1850 West Pinnacle Peak Road, Phoenix, Arizona 85027
Increased $9,750.00
No change.

☆ U. S. GOVERNMENT PRINTING OFFICE : 1978 O - 261-267 (3)